# STIC Search Report

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| TO: Jonathan Crepeau<br>Location: Remsen 6d59<br>Tuesday, September 26, 2006<br>Art Unit: 1745<br>Phone: 571-272-1299<br>Serial Number: 10 / 720219 | From: Jan Delaval<br>Location: EIC 1700<br>Remsen 4a30<br>Phone: 571-272-2504<br><br>jan.delaval@uspto.gov |

## Search Notes

202698

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**Your Contact Information:**

*** Email Address:** jonathan.crepeau@uspto
*(e.g., Susan.Smith@uspto.gov)*

SCIENTIFIC REFERENCE BR
Sci & Tech Inf Ctr
SEP 25 RECD
Pat. & T.M Office

**Mailbox No.:** 21299

*** Case serial number:** 10/720219
*If not related to a patent application, please enter NA here.*

**Class / Subclass(es)** 429/321

**Earliest Priority Filing Date:** 11/27/02

**Format preferred for results:**
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Jan
9/26/06

Broadly, a compound comprising lithium, phosphorous, oxygen, nitrogen, and a transition metal (i.e., lithium phosphorous oxynitride + a transition metal). Preferable use is a battery electrolyte.

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CLAIMS

1. A solid electrolyte comprising lithium phosphorus oxynitride and a transition metal element.

2. The solid electrolyte in accordance with claim 1, wherein said transition metal element is at least one selected from the group consisting of Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zr, Nb, Mo, Ru, Ag, Ta, W, Pt and Au.

3. The solid electrolyte in accordance with claim 1, wherein the content of said transition metal element is 1 to 50 atom% to phosphorus atoms.

4. An all-solid battery comprising a solid electrolyte comprising lithium phosphorus oxynitride and a transition metal element.

=> fil hcaplus
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FILE COVERS 1907 - 26 Sep 2006 VOL 145 ISS 14
FILE LAST UPDATED: 25 Sep 2006 (20060925/ED)

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L72 ANSWER 1 OF 10 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2006:3032 HCAPLUS
DN 144:91111
TI Method for fabrication of rechargeable thin film battery
IN Goldner, Ronald B.; Liu, Te-Yang; Goldner, Mark A.; Gerouki, Alexandra; Haas, Terry E.
PA Trustees of Tufts College, USA
SO U.S., 25 pp., Cont.-in-part of U.S. Ser. No. 951,085, abandoned.
CODEN: USXXAM
DT Patent
LA English
FAN.CNT 2

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|---|---|---|---|---|---|
| PI | US 6982132 | B1 | 20060103 | US 2000-638444 | 20000814 <-- |
| PRAI | US 1997-951085 | B2 | 19971015 <-- | | |

AB A rechargeable, stackable, thin film, solid-state lithium electrochem. cell, thin film lithium battery and method for making the same is disclosed. The cell and battery provide for a variety configurations, voltage and current capacities. An innovative low temperature ion beam assisted deposition method for fabricating thin film, solid-state anodes, cathodes and electrolytes is disclosed wherein a source of energetic ions and evaporants combine to form thin film cell components having preferred crystallinity, structure and orientation. The disclosed batteries are particularly useful as power sources for portable electronic devices and elec. vehicle applications where high energy d., high reversible charge capacity, high discharge current and long battery lifetimes are required.
IT **7440-02-0**, Nickel, uses **7440-47-3**, Chromium, uses **7440-48-4**, Cobalt, uses **7440-50-8**, Copper, uses **184905-46-2, Lithium nitrogen phosphorus oxide**
RL: DEV (Device component use); USES (Uses)
(method for fabrication of rechargeable thin film battery)

RN 7440-02-0 HCAPLUS
CN Nickel (8CI, 9CI) (CA INDEX NAME)

Ni

RN 7440-47-3 HCAPLUS
CN Chromium (8CI, 9CI) (CA INDEX NAME)

Cr

RN 7440-48-4 HCAPLUS
CN Cobalt (8CI, 9CI) (CA INDEX NAME)

Co

RN 7440-50-8 HCAPLUS
CN Copper (7CI, 8CI, 9CI) (CA INDEX NAME)

Cu

RN 184905-46-2 HCAPLUS
CN Lithium nitrogen phosphorus oxide (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | x | 17778-88-0 |
| O | x | 17778-80-2 |
| P | x | 7723-14-0 |
| Li | x | 7439-93-2 |

RETABLE

| Referenced Author (RAU) | Year (RPY) | VOL (RVL) | PG (RPG) | Referenced Work (RWK) | Referenced File |
|---|---|---|---|---|---|
| Anonymous | 1982 | C4 | | The New York Times | |
| Arntz | 1992 | | | US 5171413 A | HCAPLUS |
| Arntz, F | 1990 | 67 | 3177 | J Appl Phys | HCAPLUS |
| Arntz, F | 1989 | 1149 | 40 | SPIE | HCAPLUS |
| Bates | 1994 | | | US 5338625 A | HCAPLUS |
| Bates | 1995 | | | US 5455126 A | HCAPLUS |
| Bates | 1996 | | | US 5512147 A | HCAPLUS |
| Bates | 1996 | | | US 5561004 A | |
| Bates | 1996 | | | US 5569520 A | HCAPLUS |
| Bates | 1997 | | | US 5597660 A | HCAPLUS |
| Bates | 1997 | | | US 5612152 A | HCAPLUS |
| Bates, J | 1997 | 43 | M644 | ASAIO Journal | MEDLINE |
| Bates, J | 1993 | | 35 | Ceramic Thin and Thi | |
| Bates, J | 2000 | 147 | 59 | J Electrochem Soc | HCAPLUS |
| Bates, J | 1995 | 54 | 58 | J of Power Sources | HCAPLUS |
| Bates, J | 1993 | 43-44 | 103 | Journal of Power Sou | |
| Bates, J | 1994 | 70/71 | 619 | Solid State Ionics | |

| | | | | | |
|---|---|---|---|---|---|
| Berera, G | 1991 | 210 | 69 | Mat Res Soc Symp Pro | HCAPLUS |
| Coetzer | 1982 | | | US 4366215 A | HCAPLUS |
| Dasgupta | 1996 | | | US 5498489 A | HCAPLUS |
| Demiryont | 1993 | | | US 5253101 A | HCAPLUS |
| Gerouki, A | 1996 | 143 | L262 | J Electrochem Soc | HCAPLUS |
| Goldner | 1989 | | | US 4832463 A | HCAPLUS |
| Goldner | 1989 | | | US 4876628 A | HCAPLUS |
| Goldner | 1991 | | | US 5051274 A | HCAPLUS |
| Goldner | 1993 | | | US 5189550 A | HCAPLUS |
| Goldner | 1996 | | | US 5532869 A | HCAPLUS |
| Goldner, R | 1983 | 43 | 1093 | Appl Phys Lett | HCAPLUS |
| Goldner, R | 1985 | 47 | 536 | Appl Phys Lett | HCAPLUS |
| Goldner, R | 1993 | 62 | 1699 | Appl Phys Lett | HCAPLUS |
| Goldner, R | 1985 | 24 | 2283 | Applied Optics | HCAPLUS |
| Goldner, R | 1995 | 95-22 | 173 | Electrochemical Soci | |
| Goldner, R | 1996 | 143 | L129 | J Electrochem Soc | HCAPLUS |
| Goldner, R | 1995 | 13 | 1088 | J Vac Sci Technol A | HCAPLUS |
| Goldner, R | 1995 | 369 | 137 | Mat Res Soc Symp Pro | HCAPLUS |
| Goldner, R | 1994 | 1536 | 34 | Proc SPIE | |
| Goldner, R | 1999 | 98-15 | 268 | Proc Symp Selected B | HCAPLUS |
| Goldner, R | 1989 | 90-2 | 14 | Proceedings Symp | |
| Goldner, R | 1987 | 823 | 101 | SPIE | HCAPLUS |
| Goldner, R | 1984 | 11 | 177 | Solar Energy Materia | HCAPLUS |
| Goldner, R | 1985 | 12 | 403 | Solar Energy Materia | HCAPLUS |
| Goldner, R | 1986 | 14 | 195 | Solar Energy Materia | HCAPLUS |
| Goldner, R | 1988 | 28-30 | 1715 | Solid State Ionics | |
| Goldner, R | 1992 | 53-56 | 617 | Solid State Ionics | HCAPLUS |
| Goldner, R | 1994 | 70/71 | 613 | Solid State Ionics | |
| Green | 1990 | | | US 4902110 A | |
| Gummow, R | 1992 | 53-56 | 681 | Solid State Ionics | HCAPLUS |
| Haas | 1992 | | | US 5133594 A | HCAPLUS |
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| Haas, T | 1988 | IS4 | 170 | SPIE Institute Serie | |
| Hobson | 1995 | | | US 5445906 A | HCAPLUS |
| Idota | 1997 | | | US 5686203 A | HCAPLUS |
| Johnson | 2001 | | | US 6242129 B1 | HCAPLUS |
| Julien, C | 1994 | | 146 | Solid State Batterie | |
| Kenny, L | 1996 | 415 | 213 | Materials Research S | HCAPLUS |
| Kirimura, H | 1999 | | | Japanese Kokai Paten | |
| Levasseur, S | 2000 | 128 | 11 | Solid State Ionics | HCAPLUS |
| Liu | 1999 | | | US 5908715 A | HCAPLUS |
| Neudecker | 2001 | | | US 6168884 B1 | HCAPLUS |
| Ovshinsky | 1996 | | | US 5512387 A | HCAPLUS |
| Ozaki | 1998 | | | US 5789111 A | HCAPLUS |
| Rauh | 1989 | | | US 4889414 A | |
| Rosen, E | 1993 | 62 | 53 | Solid State Ionics | |
| Seward, G | 1987 | 823 | 90 | SPIE | HCAPLUS |
| Shackle | 1994 | | | US 5300373 A | HCAPLUS |
| Shokoohi | 1992 | | | US 5110696 A | HCAPLUS |
| Thackeray, M | 1995 | 142 | 2558 | J Electrochem Soc | HCAPLUS |
| Thackeray, M | 1994 | | 233 | Proc Symp Rechargabl | |
| Thomas, M | 1985 | 17 | 13 | Solid State Ionics | HCAPLUS |
| Wang, B | 1996 | 143 | 3203 | J Electrochem Soc | HCAPLUS |
| Wang, H | 1999 | 146 | 473 | J Electrochem Soc | HCAPLUS |
| Wei, G | 1989 | 90 | 80 | Proc Electrochemical | |
| Wei, G | 1992 | 58 | 115 | Solid State Ionics | HCAPLUS |
| Weiss, R | 1991 | | 21 | Lasers & Optronics | |
| Weppner | 1993 | | | US 5202788 A | HCAPLUS |
| Wong, K | 1987 | 823 | 84 | SPIE | HCAPLUS |

L72 ANSWER 2 OF 10 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2005:1330965 HCAPLUS
DN 144:72220
TI Active mass for secondary nonaqueous electrolyte battery, its manufacture, and the battery which uses the active mass
IN Yoshizawa, Hiroshi; Nakanishi, Shinji; Koshina, Shigeru
PA **Matsushita Electric Industrial Co., Ltd., Japan**
SO Jpn. Kokai Tokkyo Koho, 12 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

| PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|---|---|---|---|---|
| PI JP 2005353320 | A2 | 20051222 | JP 2004-170243 | 20040608 |
| PRAI JP 2004-170243 | | 20040608 | | |

AB The active mass comprises a N-containing phosphate; and is manufactured by heating a phosphate compound in a reducing atmospheric; and reacting with NH3 gas. The battery has a cathode and/or an anode containing the above active mass.
IT **871836-55-4DP**, Iron lithium nitride phosphate (FeLiN0.2(PO4)), oxygen deficient
RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)
(electrode active mass having nitrogen-containing phosphate compds. for secondary lithium batteries)
RN 871836-55-4 HCAPLUS
CN Iron lithium nitride phosphate (FeLiN0.2(PO4)) (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | 0.2 | 17778-88-0 |
| O4P | 1 | 14265-44-2 |
| Li | 1 | 7439-93-2 |
| Fe | 1 | 7439-89-6 |

L72 ANSWER 3 OF 10 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2005:474798 HCAPLUS
DN 143:29428
TI Method for producing energy device
IN Honda, Kazuyoshi; Oishi, Kiichiro; Bito, Yasuhiko; Nakamoto, Takayuki
PA **Matsushita Electric Industrial Co., Ltd., Japan**
SO U.S. Pat. Appl. Publ., 18 pp.
CODEN: USXXCO
DT Patent
LA English
FAN.CNT 2

| PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|---|---|---|---|---|
| PI US 2005118504 | A1 | 20050602 | US 2004-985543 | 20041110 |
| JP 2005183365 | A2 | 20050707 | JP 2004-322515 | 20041105 |
| JP 2005183366 | A2 | 20050707 | JP 2004-322516 | 20041105 |
| PRAI JP 2003-397567 | A | 20031127 | | |

AB An auxiliary film-forming source containing a main component element of a collector and a neg. active material film-forming source for forming a neg. active material thin film are placed adjacent to each other so that parts of film-forming particles from the resp. sources are mixed with each other. The collector is moved relatively from the auxiliary film-forming source side to the neg. active material film-forming source side, whereby

a neg. active material thin film containing silicon as a main component is formed on the collector by a vacuum film-forming process. A composition gradient layer, in which a composition distribution of a main component element of the collector and silicon constituting the neg. active material is varied smoothly, is formed at the interface between the neg. active material thin film and the collector. Even when the silicon particles in the neg. active material expand/contract during charging/discharging, the composition gradient layer alleviates the strain involved in the expansion/contraction of the silicon particles, so that peeling at the interface between the neg. active material thin film and the collector is suppressed, and the adhesion strength is enhanced. Consequently, cycle characteristics are enhanced.

IT **7440-50-8**, Copper, uses **852709-57-0**, Lithium metaphosphate nitride oxide (Li2.9(PO3)N0.36O0.3)
RL: DEV (Device component use); USES (Uses)
(method for producing energy device)

RN 7440-50-8 HCAPLUS
CN Copper (7CI, 8CI, 9CI) (CA INDEX NAME)

Cu

RN 852709-57-0 HCAPLUS
CN Lithium metaphosphate nitride oxide (Li2.9(PO3)N0.36O0.3) (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | 0.36 | 17778-88-0 |
| O | 0.3 | 17778-80-2 |
| O3P | 1 | 15389-19-2 |
| Li | 2.9 | 7439-93-2 |

L72 ANSWER 4 OF 10 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2005:16060 HCAPLUS
DN 142:97542
TI Solid electrolyte for all-solid battery
IN **Ugaji, Masaya; Mino, Shinji; Shibano, Yasuyuki ; Ito, Shuji**
PA **Matsushita Electric Industrial Co., Ltd., Japan**
SO PCT Int. Appl., 28 pp.
CODEN: PIXXD2
DT Patent
LA Japanese
FAN.CNT 1

| PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|---|---|---|---|---|
| PI WO 2005001982 | A1 | 20050106 | WO 2004-JP9299 | 20040624 |

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW
RW: BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE,

SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG

| | | | | | |
|---|---|---|---|---|---|
| | JP 2005038844 | A2 | 20050210 | JP 2004-186807 | 20040624 |
| | JP 3677509 | B2 | 20050803 | | |
| | EP 1675206 | A1 | 20060628 | EP 2004-746768 | 20040624 |
| | R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, FI, RO, CY, TR, BG, CZ, EE, HU, PL, SK | | | | |
| | CN 1799161 | A | 20060705 | CN 2004-80014895 | 20040624 |
| PRAI | JP 2003-184626 | A | 20030627 | | |
| | WO 2004-JP9299 | W | 20040624 | | |

AB The title solid electrolyte can be represented by the following general formula: LixMOvNz (wherein M represents at least one element selected from the group consisting of Si, B, Ge, Al, C, Ga and S; and x = 0.6-5.0, v = 1.050-3.985, and z = 0.01-0.50). The material is used for preparation of all-solid battery and is characterized by having good resistance to humidity.

IT **7440-06-4**, Platinum, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(solid electrolyte for preparation of all-solid battery)
RN 7440-06-4 HCAPLUS
CN Platinum (8CI, 9CI) (CA INDEX NAME)

Pt

IT **693781-19-0**, Lithium metaphosphate nitride oxide (Li2.8(PO3)N0.3O0.45)
RL: TEM (Technical or engineered material use); USES (Uses)
(solid electrolyte; solid electrolyte for preparation of all-solid battery)
RN 693781-19-0 HCAPLUS
CN Lithium metaphosphate nitride oxide (Li2.8(PO3)N0.3O0.45) (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | 0.3 | 17778-88-0 |
| O | 0.45 | 17778-80-2 |
| O3P | 1 | 15389-19-2 |
| Li | 2.8 | 7439-93-2 |

RETABLE

| Referenced Author (RAU) | Year (RPY) | VOL (RVL) | PG (RPG) | Referenced Work (RWK) | Referenced File |
|---|---|---|---|---|---|
| Sumitomo Electric Indus | 2000 | | | JP 2000340257 A | HCAPLUS |
| Sumitomo Electric Indus | 2002 | | | JP 2002203593 A | HCAPLUS |

L72 ANSWER 5 OF 10 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2004:802385 HCAPLUS
DN 141:298755
TI Ionically conductive membranes for protection of active metal anodes and battery cells
IN Visco, Steven J.; Nimon, Yevgeniy S.; Katz, Bruce D.
PA Polyplus Battery Company, USA
SO U.S. Pat. Appl. Publ., 25 pp., Cont.-in-part of U.S. Ser. No. 731,771.
CODEN: USXXCO
DT Patent
LA English

FAN.CNT 5

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|---|---|---|---|---|---|
| PI | US 2004191617 | A1 | 20040930 | US 2004-772228 | 20040203 <-- |
| | US 2004126653 | A1 | 20040701 | US 2003-686189 | 20031014 <-- |
| | US 2004142244 | A1 | 20040722 | US 2003-731771 | 20031205 <-- |
| | WO 2005038962 | A2 | 20050428 | WO 2004-US33372 | 20041008 |
| | WO 2005038962 | A3 | 20051229 | | |
| | W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW | | | | |
| | RW: BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG | | | | |
| | US 2005100793 | A1 | 20050512 | US 2004-986441 | 20041110 |
| PRAI | US 2002-418899P | P | 20021015 <-- | | |
| | US 2003-511710P | P | 20031014 | | |
| | US 2003-686189 | A2 | 20031014 | | |
| | US 2003-518948P | P | 20031110 | | |
| | US 2003-731771 | A2 | 20031205 | | |
| | US 2004-772228 | A | 20040203 | | |

AB Disclosed are ionically conductive membranes for protection of active metal anodes and methods for their fabrication. The membranes may be incorporated in active metal anode structures and battery cells. In accordance with the invention, the membrane has the desired properties of high overall ionic conductivity and chemical stability towards the anode, the cathode and ambient conditions encountered in battery manufacturing The membrane is capable of protecting an active metal anode from deleterious reaction with other battery components or ambient conditions while providing a high level of ionic conductivity to facilitate manufacture and/or enhance performance of a battery cell in which the membrane is incorporated.

IT **184905-46-2, Lithium nitrogen phosphorus oxide**
RL: DEV (Device component use); USES (Uses)
(ionically conductive membranes for protection of active metal anodes and battery cells)
RN 184905-46-2 HCAPLUS
CN Lithium nitrogen phosphorus oxide (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | x | 17778-88-0 |
| O | x | 17778-80-2 |
| P | x | 7723-14-0 |
| Li | x | 7439-93-2 |

IT **7440-50-8**, Copper, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(substrate; ionically conductive membranes for protection of active metal anodes and battery cells)
RN 7440-50-8 HCAPLUS
CN Copper (7CI, 8CI, 9CI) (CA INDEX NAME)

Cu

L72 ANSWER 6 OF 10 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2004:780200 HCAPLUS
DN 141:246156
TI All solid-state thin-film battery and application thereof
IN **Ito, Shuji; Ugaji, Masaya; Mino, Shinji;**
Inaba, Junichi
PA **Matsushita Electric Industrial Co., Ltd., Japan**
SO U.S. Pat. Appl. Publ., 15 pp.
CODEN: USXXCO
DT Patent
LA English
FAN.CNT 1

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|---|---|---|---|---|---|
| PI | US 2004185336 | A1 | 20040923 | US 2004-778168 | 20040217 |
| | JP 2004273436 | A2 | 20040930 | JP 2004-16261 | 20040123 |
| PRAI | JP 2003-39617 | A | 20030218 | | |

AB The invention concerns an all solid-state thin-film cell, comprising stacked plural power generating elements, where the plural power generating elements are connected in series or in parallel, each of the plural power generating elements comprises a first current collector, a first electrode, a solid electrolyte, a second electrode and a second current collector, which are successively stacked in this order, and a buffer layer is interposed between at least one pair of the power generating elements.
IT **477704-33-9**, Lithium nitride oxide phosphide (Li2.9N0.46O3.3P)
RL: DEV (Device component use); USES (Uses)
(all solid-state thin-film battery and application thereof)
RN 477704-33-9 HCAPLUS
CN Lithium nitride oxide phosphide (Li2.9N0.46O3.3P) (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | 0.46 | 17778-88-0 |
| O | 3.3 | 17778-80-2 |
| P | 1 | 7723-14-0 |
| Li | 2.9 | 7439-93-2 |

IT **7440-22-4**, Silver, uses **7440-57-5**, Gold, uses
RL: DEV (Device component use); USES (Uses)
(buffer layer material; all solid-state thin-film battery and application thereof)
RN 7440-22-4 HCAPLUS
CN Silver (8CI, 9CI) (CA INDEX NAME)

Ag

RN 7440-57-5 HCAPLUS
CN Gold (8CI, 9CI) (CA INDEX NAME)

Au

IT **7440-06-4**, Platinum, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(coating; all solid-state thin-film battery and application thereof)
RN 7440-06-4 HCAPLUS
CN Platinum (8CI, 9CI) (CA INDEX NAME)

Pt

L72 ANSWER 7 OF 10 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2004:589102 HCAPLUS
DN 141:126371
TI Ionically conductive composites for protection of active metal anodes in batteries
IN Visco, Steven J.; Nimon, Yevgeniy S.; Katz, Bruce D.
PA Polyplus Battery Company, USA
SO U.S. Pat. Appl. Publ., 23 pp., Cont.-in-part of U.S. Ser. No. 686,189.
CODEN: USXXCO
DT Patent
LA English
FAN.CNT 5

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE | |
|---|---|---|---|---|---|---|
| PI | US 2004142244 | A1 | 20040722 | US 2003-731771 | 20031205 | <-- |
| | US 2004126653 | A1 | 20040701 | US 2003-686189 | 20031014 | <-- |
| | US 2004191617 | A1 | 20040930 | US 2004-772228 | 20040203 | <-- |
| | US 2004197641 | A1 | 20041007 | US 2004-772157 | 20040203 | <-- |
| | WO 2005038962 | A2 | 20050428 | WO 2004-US33372 | 20041008 | |
| | WO 2005038962 | A3 | 20051229 | | | |

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW
RW: BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG

| | | | | |
|---|---|---|---|---|
| PRAI | US 2002-418899P | P | 20021015 | <-- |
| | US 2003-686189 | A2 | 20031014 | |
| | US 2003-511710P | P | 20031014 | |
| | US 2003-518948P | P | 20031110 | |
| | US 2003-526662P | P | 20031202 | |
| | US 2003-527098P | P | 20031203 | |
| | US 2003-731771 | A2 | 20031205 | |
| | US 2004-536688P | P | 20040114 | |
| | US 2004-536689P | P | 20040114 | |
| | US 2004-772228 | A | 20040203 | |

AB Disclosed are ionically conductive composites for protection of active metal anodes and methods for their fabrication. The composites may be incorporated in active metal anode structures and battery cells. In accordance with the invention, the properties of different ionic

conductors are combined in a composite material that has the desired properties of high overall ionic conductivity and chemical stability towards the anode, the cathode and ambient conditions encountered in battery manufacturing The composite is capable of protecting an active metal anode from deleterious reaction with other battery components or ambient conditions while providing a high level of ionic conductivity to facilitate manufacture and/or enhance performance of a battery cell in which the composite is incorporated.

IT **7440-50-8**, COpper, uses **184905-46-2, Lithium nitrogen phosphorus oxide**
RL: TEM (Technical or engineered material use); USES (Uses)
(ionically conductive composites for protection of active metal anodes in batteries)

RN 7440-50-8 HCAPLUS
CN Copper (7CI, 8CI, 9CI) (CA INDEX NAME)

Cu

RN 184905-46-2 HCAPLUS
CN Lithium nitrogen phosphorus oxide (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | x | 17778-88-0 |
| O | x | 17778-80-2 |
| P | x | 7723-14-0 |
| Li | x | 7439-93-2 |

L72 ANSWER 8 OF 10 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2004:530045 HCAPLUS
DN 141:74252
TI Laminated film and its manufacture by ion beam sputtering for all solid secondary lithium ion battery
IN Ukaji, Masaya; Higuchi, Hiroshi; **Ito, Shuji; Mino, Shinji**; Inaba, Junichi
PA **Matsushita Electric Industrial Co., Ltd., Japan**
SO Jpn. Kokai Tokkyo Koho, 18 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

| PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|---|---|---|---|---|
| PI JP 2004183078 | A2 | 20040702 | JP 2002-354088 | 20021205 <-- |
| PRAI JP 2002-354088 | | 20021205 <-- | | |

AB The claimed laminated film is formed on a substrate by simultaneously irradiating a film material source, a cation, and an anion and then simultaneously irradiating a film material source, a cation, and an electron. The claimed battery is equipped with, on a substrate, a first current collector, a first active mass and a solid electrolyte, a second active mass, and a second current collector, where the solid electrolyte is formed by simultaneously irradiating a film material source, a cation, and an anion and the second active mass is formed by simultaneously irradiating a film material source, a cation, and an electron. Alternatively, the solid electrolyte is formed by simultaneously

irradiating a film material source, a cation, and an electron. Alternatively, the second active mass is formed by simultaneously irradiating a film material source, a cation, and an anion. The laminated film, especially suitable for batteries and capacitors, is manufactured by suppressed electrostatic charging.

IT **7440-48-4**, Cobalt, processes
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
(in lithium cobaltate preparation; laminated film manufacture by ion beam sputtering with cation and anion for secondary lithium ion battery)
RN 7440-48-4 HCAPLUS
CN Cobalt (8CI, 9CI) (CA INDEX NAME)

Co

IT **7440-62-2**, Vanadium, processes
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
(in vanadium oxide preparation; laminated film manufacture by ion beam sputtering with cation and anion for secondary lithium ion battery)
RN 7440-62-2 HCAPLUS
CN Vanadium (8CI, 9CI) (CA INDEX NAME)

V

IT **693781-19-0P**, Lithium metaphosphate nitride oxide (Li2.8(PO3)N0.3O0.45)
RL: DEV (Device component use); IMF (Industrial manufacture); PEP (Physical, engineering or chemical process); PYP (Physical process); PREP (Preparation); PROC (Process); USES (Uses)
(solid electrolyte; laminated film manufacture by ion beam sputtering with cation and anion for secondary lithium ion battery)
RN 693781-19-0 HCAPLUS
CN Lithium metaphosphate nitride oxide (Li2.8(PO3)N0.3O0.45) (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | 0.3 | 17778-88-0 |
| O | 0.45 | 17778-80-2 |
| O3P | 1 | 15389-19-2 |
| Li | 2.8 | 7439-93-2 |

L72 ANSWER 9 OF 10 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2004:451536 HCAPLUS
DN 141:9627
TI Solid electrolyte for all-solid battery
IN **Ugaji, Masaya; Mino, Shinji; Shibano, Yasuyuki ; Ito, Shuji**
PA Japan
SO U.S. Pat. Appl. Publ., 9 pp.
CODEN: USXXCO

INSTANT APPLICATION

DT Patent
LA English
FAN.CNT 1

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|---|---|---|---|---|---|
| PI | US 2004106045 | A1 | 20040603 | US 2003-720219 | 20031125 <-- |
| | JP 2004193112 | A2 | 20040708 | JP 2003-386846 | 20031117 <-- |
| | KR 2004047610 | A | 20040605 | KR 2003-83450 | 20031124 <-- |
| | CN 1503395 | A | 20040609 | CN 2003-10120000 | 20031127 <-- |
| | EP 1434298 | A2 | 20040630 | EP 2003-257500 | 20031127 <-- |
| | R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, SK | | | | |
| PRAI | JP 2002-344470 | A | 20021127 <-- | | |

AB To inhibit decrease in charge-discharge, storage and charge-discharge cycle characteristics due to reduction of phosphorus atoms in a battery including **lithium phosphorus oxynitride** as a solid electrolyte, a transition metal element is incorporated into **lithium phosphorus oxynitride** to prepare a solid electrolyte.

IT **184905-46-2, Lithium nitrogen phosphorus oxide 693781-19-0,** Lithium metaphosphate nitride oxide (Li2.8(PO3)N0.3O0.45)
RL: DEV (Device component use); USES (Uses)
(solid electrolyte for all-solid battery)

RN 184905-46-2 HCAPLUS
CN Lithium nitrogen phosphorus oxide (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | x | 17778-88-0 |
| O | x | 17778-80-2 |
| P | x | 7723-14-0 |
| Li | x | 7439-93-2 |

RN 693781-19-0 HCAPLUS
CN Lithium metaphosphate nitride oxide (Li2.8(PO3)N0.3O0.45) (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | 0.3 | 17778-88-0 |
| O | 0.45 | 17778-80-2 |
| O3P | 1 | 15389-19-2 |
| Li | 2.8 | 7439-93-2 |

IT **7439-89-6**, Iron, uses **7439-96-5**, Manganese, uses **7439-98-7**, Molybdenum, uses **7440-02-0**, Nickel, uses **7440-03-1**, Niobium, uses **7440-06-4**, Platinum, uses **7440-18-8**, Ruthenium, uses **7440-22-4**, Silver, uses **7440-25-7**, Tantalum, uses **7440-32-6**, Titanium, uses **7440-33-7**, Tungsten, uses **7440-47-3**, Chromium, uses **7440-48-4**, Cobalt, uses **7440-50-8**, Copper, uses **7440-57-5**, Gold, uses **7440-62-2**, Vanadium, uses **7440-67-7**, Zirconium, uses
RL: MOA (Modifier or additive use); USES (Uses)
(solid electrolyte for all-solid battery)

RN 7439-89-6 HCAPLUS
CN Iron (7CI, 8CI, 9CI) (CA INDEX NAME)

Fe

RN 7439-96-5 HCAPLUS
CN Manganese (8CI, 9CI) (CA INDEX NAME)

Mn

RN 7439-98-7 HCAPLUS
CN Molybdenum (8CI, 9CI) (CA INDEX NAME)

Mo

RN 7440-02-0 HCAPLUS
CN Nickel (8CI, 9CI) (CA INDEX NAME)

Ni

RN 7440-03-1 HCAPLUS
CN Niobium (8CI, 9CI) (CA INDEX NAME)

Nb

RN 7440-06-4 HCAPLUS
CN Platinum (8CI, 9CI) (CA INDEX NAME)

Pt

RN 7440-18-8 HCAPLUS
CN Ruthenium (8CI, 9CI) (CA INDEX NAME)

Ru

RN 7440-22-4 HCAPLUS
CN Silver (8CI, 9CI) (CA INDEX NAME)

Ag

RN 7440-25-7 HCAPLUS
CN Tantalum (8CI, 9CI) (CA INDEX NAME)

Ta

RN 7440-32-6 HCAPLUS
CN Titanium (8CI, 9CI) (CA INDEX NAME)

Ti

RN 7440-33-7 HCAPLUS
CN Tungsten (8CI, 9CI) (CA INDEX NAME)

W

RN 7440-47-3 HCAPLUS
CN Chromium (8CI, 9CI) (CA INDEX NAME)

Cr

RN 7440-48-4 HCAPLUS
CN Cobalt (8CI, 9CI) (CA INDEX NAME)

Co

RN 7440-50-8 HCAPLUS
CN Copper (7CI, 8CI, 9CI) (CA INDEX NAME)

Cu

RN 7440-57-5 HCAPLUS
CN Gold (8CI, 9CI) (CA INDEX NAME)

Au

RN 7440-62-2 HCAPLUS
CN Vanadium (8CI, 9CI) (CA INDEX NAME)

V

RN 7440-67-7 HCAPLUS
CN Zirconium (8CI, 9CI) (CA INDEX NAME)

Zr

L72 ANSWER 10 OF 10 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2002:637990 HCAPLUS

DN 137:188206
TI Solid electrolyte battery and its manufacture
IN **Mino, Shinji**; Iwamoto, Kazuya; Unoki, Shigeyuki; Ishii, Hironori
PA **Matsushita Electric Industrial Co., Ltd., Japan**
SO PCT Int. Appl., 46 pp.
CODEN: PIXXD2
DT Patent
LA Japanese
FAN.CNT 1

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|---|---|---|---|---|---|
| PI | WO 2002065573 | A1 | 20020822 | WO 2002-JP1163 | 20020212 <-- |
| | WO 2002065573 | B1 | 20021114 | | |
| | WO 2002065573 | C1 | 20030213 | | |
| | W: JP, US | | | | |
| | RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR | | | | |
| | US 2003118897 | A1 | 20030626 | US 2002-276665 | 20021119 <-- |
| PRAI | JP 2001-38561 | A | 20010215 <-- | | |
| | WO 2002-JP1163 | W | 20020212 <-- | | |

AB The battery has a substrate selected from metal, semiconductor, glass, ceramic, and resin having a recessed area and ≥1 of electrode active mass-solid electrolyte-electrode active mass laminates in the recessed area. The battery is prepared by forming the recessed area on the substrate, and forming the laminates in the area.

IT **7440-50-8**, Copper, uses
RL: DEV (Device component use); USES (Uses)
(structure and manufacture of secondary solid electrolyte copper/titanium sulfide batteries on substrates with recessed areas)
RN 7440-50-8 HCAPLUS
CN Copper (7CI, 8CI, 9CI) (CA INDEX NAME)

Cu

IT **203402-92-0**, Lithium nitride phosphate
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses)
(structure and manufacture of secondary solid electrolyte lithium batteries on substrates with recessed areas)
RN 203402-92-0 HCAPLUS
CN Lithium nitride phosphate (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | x | 17778-88-0 |
| O4P | x | 14265-44-2 |
| Li | x | 7439-93-2 |

IT **7440-22-4**, Silver, uses
RL: DEV (Device component use); USES (Uses)
(structure and manufacture of secondary solid electrolyte silver/vanadium oxide batteries on substrates with recessed areas)
RN 7440-22-4 HCAPLUS
CN Silver (8CI, 9CI) (CA INDEX NAME)

Ag

RETABLE

| Referenced Author (RAU) | Year (RPY) | VOL (RVL) | PG (RPG) | Referenced Work (RWK) | Referenced File |
|---|---|---|---|---|---|
| Citizen Watch Co Ltd | 1980 | | | JP 55104071 A | |
| Citizen Watch Co Ltd | 1981 | | | JP 5652868 A | |
| Citizen Watch Co Ltd | 1981 | | | JP 5688265 A | |
| Sony Corp | 1996 | | | JP 817409 A | |

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L77 ANSWER 1 OF 26 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2005:564516 HCAPLUS
DN 143:81150
TI Chemical protection of a lithium surface
IN De Jonghe, Lutgard; Visco, Steven J.; Nimon, Yevgeniy S.; Sukeshini, A. Mary
PA Polyplus Battery Co., USA
SO U.S., 16 pp.
CODEN: USXXAM
DT Patent
LA English
FAN.CNT 1

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|---|---|---|---|---|---|
| PI | US 6911280 | B1 | 20050628 | US 2002-327682 | 20021220 <-- |
| | US 2005186469 | A1 | 20050825 | US 2005-92781 | 20050328 <-- |
| PRAI | US 2001-342326P | P | 20011221 <-- | | |
| | US 2002-327682 | A1 | 20021220 <-- | | |

AB Disclosed are compns. and methods for alleviating the problem of reaction of lithium or other alkali or alkaline earth metals with incompatible processing and operating environments by creating a ionically conductive chemical protective layer on the lithium or other reactive metal surface. Such a chemical produced surface layer can protect lithium metal from reacting with oxygen, nitrogen or moisture in ambient atmospheric thereby allowing the lithium material to be handled outside of a controlled atmospheric, such as a dry room. Production processes involving lithium are thereby very considerably simplified. One example of such a process in the processing of lithium to form neg. electrodes for lithium metal **batteries**.
IT **7440-50-8**, Copper, uses
RL: DEV (Device component use); USES (Uses)
(chemical protection of lithium surface)
RN 7440-50-8 HCAPLUS
CN Copper (7CI, 8CI, 9CI) (CA INDEX NAME)

Cu

IT **184905-46-2, Lithium nitrogen phosphorus oxide**
RL: DEV (Device component use); USES (Uses)
(glass; chemical protection of lithium surface)
RN 184905-46-2 HCAPLUS
CN Lithium nitrogen phosphorus oxide (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | x | 17778-88-0 |
| O | x | 17778-80-2 |
| P | x | 7723-14-0 |
| Li | x | 7439-93-2 |

RETABLE

| Referenced Author (RAU) | Year (RPY) | VOL (RVL) | PG (RPG) | Referenced Work (RWK) | Referenced File |
|---|---|---|---|---|---|
| Barton | 2001 | | | US 6280598 B1 | HCAPLUS |
| Bates | 1994 | | | US 5314765 A | HCAPLUS |
| Chu | 2000 | | | US 6030720 A | HCAPLUS |
| Chu | 2002 | | | US 6413284 B1 | HCAPLUS |
| Chu | 2004 | | | US 6737197 B2 | HCAPLUS |
| Fleischer | 1983 | | | US 4402995 A | HCAPLUS |
| Gan | 2000 | | | US 6068950 A | HCAPLUS |
| Gan | 2000 | | | US 6096447 A | HCAPLUS |
| Gan | 2001 | | | US 6200701 B1 | HCAPLUS |
| Gan | 2001 | | | US 6203942 B1 | HCAPLUS |
| Gan | 2001 | | | US 6274269 B1 | HCAPLUS |
| Gan | 2002 | | | US 6495285 B2 | HCAPLUS |
| Gan | 2003 | | | US 6511772 B2 | HCAPLUS |
| Gan | 2003 | | | US 6537698 B2 | HCAPLUS |
| Ichihashi | 2002 | | | US 6489055 B1 | HCAPLUS |
| Raistrick | 1983 | | | US 4405416 A | HCAPLUS |
| Visco | 2000 | | | US 6025094 A | HCAPLUS |

L77 ANSWER 2 OF 26 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2004:493174 HCAPLUS
DN 141:26164
TI Anode and **battery** using the anode
IN Kawase, Kenichi; Konishiike, Isamu; Takada, Tomoo; Miyaki, Yukio
PA Sony Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 18 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

| PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|---|---|---|---|---|
| PI JP 2004171875 | A2 | 20040617 | JP 2002-335053 | 20021119 <-- |
| PRAI JP 2002-335053 | | 20021119 <-- | | |

AB The anode has an active mass layer formed on a collector, forming a alloy at least on part of the boundary between the active mass and the collector, and an ion conductive inorg. compound layer on the active mass layer. The active mass contains Sn or Si or their compound, and the inorg. compound is selected from LiF, LiBr, LiI, LiCl, Li3N, Li2S, Li2SiO3, Li2CO3, Li2SO4, Li3PO4, Li3P, and Li phosphate nitride.
IT **668998-68-3**, Lithium phosphorus nitride oxide (LiPNO)
RL: DEV (Device component use); USES (Uses)
(anodes containing ion conductive inorg. compound on active mass layer for secondary lithium **batteries**)
RN 668998-68-3 HCAPLUS
CN Lithium phosphorus nitride oxide (LiPNO) (9CI) (CA INDEX NAME)

| Component | Ratio | Component |
|---|---|---|

| | | Registry Number |
|---|---|---|
| N | 1 | 17778-88-0 |
| O | 1 | 17778-80-2 |
| P | 1 | 7723-14-0 |
| Li | 1 | 7439-93-2 |

IT **7440-50-8**, Copper, uses
RL: DEV (Device component use); USES (Uses)
(collectors for anodes containing ion conductive inorg. compound on active mass layer for secondary lithium **batteries**)
RN 7440-50-8 HCAPLUS
CN Copper (7CI, 8CI, 9CI) (CA INDEX NAME)

Cu

L77 ANSWER 3 OF 26 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2004:310725 HCAPLUS
DN 140:324230
TI Lithium metal anode for lithium **battery**
IN Cho, Chung-Kun; Lee, Sang-Mock; Lee, Jong-Ki; Kim, Min-Seuk
PA Samsung SDI Co., Ltd., S. Korea
SO U.S. Pat. Appl. Publ., 5 pp.
CODEN: USXXCO
DT Patent
LA English
FAN.CNT 1

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|---|---|---|---|---|---|
| PI | US 2004072066 | A1 | 20040415 | US 2003-389752 | 20030318 <-- |
| | KR 2004035909 | A | 20040430 | KR 2002-62256 | 20021012 <-- |
| | CN 1489229 | A | 20040414 | CN 2003-120528 | 20030313 <-- |
| | JP 2004134403 | A2 | 20040430 | JP 2003-349215 | 20031008 <-- |
| | JP 3787564 | B2 | 20060621 | | |
| PRAI | KR 2002-62256 | A | 20021012 <-- | | |

AB Provided is a lithium metal anode having a lithium metal layer and a porous polymer film integrated with a surface of the lithium metal layer. The lithium metal anode further includes a current collector attached to the surface of the lithium metal layer opposite the porous polymer film. The lithium metal anode further includes a protective coating layer between the porous polymer film and the lithium metal layer, the protective coating layer having lithium ionic conductivity and impermeable to an **electrolyte**.
IT **7440-02-0**, Nickel, uses **7440-50-8**, Copper, uses
RL: DEV (Device component use); USES (Uses)
(current collector; lithium metal anode for lithium **battery**)
RN 7440-02-0 HCAPLUS
CN Nickel (8CI, 9CI) (CA INDEX NAME)

Ni

RN 7440-50-8 HCAPLUS
CN Copper (7CI, 8CI, 9CI) (CA INDEX NAME)

Cu

IT **184905-46-2, Lithium nitrogen phosphorus oxide**
RL: DEV (Device component use); USES (Uses)
(lithium metal anode for lithium **battery**)
RN 184905-46-2 HCAPLUS
CN Lithium nitrogen phosphorus oxide (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | x | 17778-88-0 |
| O | x | 17778-80-2 |
| P | x | 7723-14-0 |
| Li | x | 7439-93-2 |

L77 ANSWER 4 OF 26 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2004:219379 HCAPLUS
DN 140:238499
TI Anode having lithium ion-conducting thin film, its manufacture, and **battery**
IN Konishiike, Isamu; Noda, Kazuhiro
PA Sony Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 18 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

| PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|---|---|---|---|---|
| PI JP 2004087402 | A2 | 20040318 | JP 2002-249529 | 20020828 <-- |
| PRAI JP 2002-249529 | | 20020828 <-- | | |

AB The claimed anode has a substrate for precipitating a light metal and an inorg. compound layer having light metal ion conductivity The above substrate may consist of a plurality of layers having different reactivity with the light metal. The inorg. compound layer is formed by dry thin film process, e.g., vapor deposition. The claimed **battery** is equipped with the anode and an **electrolyte** containing an **electrolyte** solution, a gelled **electrolyte**, or a polymer **electrolyte**. The anode provides uniform precipitation and dissoln. of Li by preventing dendrite growth.
IT **668998-68-3**, Lithium phosphorus nitride oxide (LiPNO)
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses)
(film; anode having lithium ion-conducting inorg. thin film manufactured by vapor deposition for **battery**)
RN 668998-68-3 HCAPLUS
CN Lithium phosphorus nitride oxide (LiPNO) (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | 1 | 17778-88-0 |
| O | 1 | 17778-80-2 |
| P | 1 | 7723-14-0 |
| Li | 1 | 7439-93-2 |

IT **7439-98-7**, Molybdenum, uses **7440-02-0**, Nickel, uses
**7440-22-4**, Silver, uses **7440-25-7**, Tantalum, uses
**7440-32-6**, Titanium, uses **7440-50-8**, Copper, uses
RL: DEV (Device component use); USES (Uses)
(substrate; anode having lithium ion-conducting inorg. thin film manufactured by vapor deposition for **battery**)
RN 7439-98-7 HCAPLUS
CN Molybdenum (8CI, 9CI) (CA INDEX NAME)

Mo

RN 7440-02-0 HCAPLUS
CN Nickel (8CI, 9CI) (CA INDEX NAME)

Ni

RN 7440-22-4 HCAPLUS
CN Silver (8CI, 9CI) (CA INDEX NAME)

Ag

RN 7440-25-7 HCAPLUS
CN Tantalum (8CI, 9CI) (CA INDEX NAME)

Ta

RN 7440-32-6 HCAPLUS
CN Titanium (8CI, 9CI) (CA INDEX NAME)

Ti

RN 7440-50-8 HCAPLUS
CN Copper (7CI, 8CI, 9CI) (CA INDEX NAME)

Cu

L77 ANSWER 5 OF 26 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2004:203429 HCAPLUS
DN 140:238481
TI Lithium vanadium oxide thin-film **battery**
IN Neudecker, Bernd J.; Lanning, Bruce; Benson, Martin H.; Armstrong, Joseph H.
PA USA
SO U.S. Pat. Appl. Publ., 30 pp.
CODEN: USXXCO
DT Patent
LA English

FAN.CNT 1

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|---|---|---|---|---|---|
| PI | US 2004048157 | A1 | 20040311 | US 2002-238905 | 20020911 <-- |
| PRAI | US 2002-238905 | | 20020911 <-- | | |

AB The manufacture and use of multilayer thin-film **batteries**, such as inverted lithium-free **batteries** is explained. The present invention provides a **battery** that may include a lithium vanadium oxide LixV2Oy (0<x≤100, 0<y≤5) pos. cathode or neg. anode. The present invention may also provide for a thin-film **battery** that may be formed on a wide variety of substrate materials and geometries.

IT **184905-46-2, Lithium nitrogen phosphorus oxide**
RL: TEM (Technical or engineered material use); USES (Uses)
(barrier layer; lithium vanadium oxide thin-film **battery**)

RN 184905-46-2 HCAPLUS

CN Lithium nitrogen phosphorus oxide (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | x | 17778-88-0 |
| O | x | 17778-80-2 |
| P | x | 7723-14-0 |
| Li | x | 7439-93-2 |

IT **7440-50-8**, Copper, uses
RL: DEV (Device component use); USES (Uses)
(current collector; lithium vanadium oxide thin-film **battery**)

RN 7440-50-8 HCAPLUS

CN Copper (7CI, 8CI, 9CI) (CA INDEX NAME)

Cu

IT **7439-89-6**, Iron, uses **7439-96-5**, Manganese, uses **7439-98-7**, Molybdenum, uses **7440-02-0**, Nickel, uses **7440-03-1**, Niobium, uses **7440-25-7**, Tantalum, uses **7440-32-6**, Titanium, uses **7440-33-7**, Tungsten, uses **7440-47-3**, Chromium, uses **7440-48-4**, Cobalt, uses **7440-67-7**, Zirconium, uses
RL: MOA (Modifier or additive use); USES (Uses)
(dopant; lithium vanadium oxide thin-film **battery**)

RN 7439-89-6 HCAPLUS

CN Iron (7CI, 8CI, 9CI) (CA INDEX NAME)

Fe

RN 7439-96-5 HCAPLUS

CN Manganese (8CI, 9CI) (CA INDEX NAME)

Mn

RN 7439-98-7 HCAPLUS

CN Molybdenum (8CI, 9CI) (CA INDEX NAME)

Mo

RN 7440-02-0 HCAPLUS
CN Nickel (8CI, 9CI) (CA INDEX NAME)

Ni

RN 7440-03-1 HCAPLUS
CN Niobium (8CI, 9CI) (CA INDEX NAME)

Nb

RN 7440-25-7 HCAPLUS
CN Tantalum (8CI, 9CI) (CA INDEX NAME)

Ta

RN 7440-32-6 HCAPLUS
CN Titanium (8CI, 9CI) (CA INDEX NAME)

Ti

RN 7440-33-7 HCAPLUS
CN Tungsten (8CI, 9CI) (CA INDEX NAME)

W

RN 7440-47-3 HCAPLUS
CN Chromium (8CI, 9CI) (CA INDEX NAME)

Cr

RN 7440-48-4 HCAPLUS
CN Cobalt (8CI, 9CI) (CA INDEX NAME)

Co

RN 7440-67-7 HCAPLUS
CN Zirconium (8CI, 9CI) (CA INDEX NAME)

Zr

IT **7440-06-4**, Platinum, uses **7440-22-4**, Silver, uses
**7440-57-5**, Gold, uses
RL: DEV (Device component use); USES (Uses)
(lithium vanadium oxide thin-film **battery**)
RN 7440-06-4 HCAPLUS
CN Platinum (8CI, 9CI) (CA INDEX NAME)

Pt

RN 7440-22-4 HCAPLUS
CN Silver (8CI, 9CI) (CA INDEX NAME)

Ag

RN 7440-57-5 HCAPLUS
CN Gold (8CI, 9CI) (CA INDEX NAME)

Au

IT **7440-62-2**, Vanadium, processes
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
(target material; lithium vanadium oxide thin-film **battery**)
RN 7440-62-2 HCAPLUS
CN Vanadium (8CI, 9CI) (CA INDEX NAME)

V

L77 ANSWER 6 OF 26 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2004:100613 HCAPLUS
DN 140:131168
TI Apparatus and method for fracture absorption layer for use in fabrication of thin-film electrochemical devices
IN Benson, Martin H.; Neudecker, Bernd J.
PA ITN Energym Systems, Inc., USA
SO U.S. Pat. Appl. Publ., 25 pp.
CODEN: USXXCO
DT Patent
LA English
FAN.CNT 1

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|---|---|---|---|---|---|
| PI | US 2004023106 | A1 | 20040205 | US 2002-210180 | 20020802 <-- |
| | US 6770176 | B2 | 20040803 | | |
| | US 2004219434 | A1 | 20041104 | US 2004-840497 | 20040506 <-- |
| PRAI | US 2002-210180 | A3 | 20020802 <-- | | |

AB An apparatus for use as a fracture absorption layer, an apparatus for use as an

electrochem. device, and methods of manufacturing the same are disclosed. The apparatus and methods of the present invention may be of particular use in the manufacture of thin-film, lightwt., flexible or conformable, electrochem. devices such as **batteries**, and arrays of such devices. The present invention may provide many advantages including stunting fractures in a first electrochem. layer from propagating in a second electrochem. layer.

IT **7440-67-7**, Zirconium, uses **184905-46-2**, **Lithium nitrogen phosphorus oxide**
RL: DEV (Device component use); USES (Uses)
(apparatus and method for fracture absorption layer for use in fabrication of thin-film electrochem. devices)

RN 7440-67-7 HCAPLUS
CN Zirconium (8CI, 9CI) (CA INDEX NAME)

Zr

RN 184905-46-2 HCAPLUS
CN Lithium nitrogen phosphorus oxide (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | x | 17778-88-0 |
| O | x | 17778-80-2 |
| P | x | 7723-14-0 |
| Li | x | 7439-93-2 |

IT **651045-64-6**, Lithium metaphosphate nitrate oxide (Li2.88(PO3)(NO3)0.14O0.31)
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
(sputter target; apparatus and method for fracture absorption layer for use in fabrication of thin-film electrochem. devices)

RN 651045-64-6 HCAPLUS
CN Lithium metaphosphate nitrate oxide (Li2.88(PO3)(NO3)0.14O0.31) (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| O | 0.31 | 17778-80-2 |
| O3P | 1 | 15389-19-2 |
| NO3 | 0.14 | 14797-55-8 |
| Li | 2.88 | 7439-93-2 |

RETABLE

| Referenced Author (RAU) | Year (RPY) | VOL (RVL) | PG (RPG) | Referenced Work (RWK) | Referenced File |
|---|---|---|---|---|---|
| Anon | 1991 | | | GB 2236540 A | HCAPLUS |
| Anon | 1996 | | | KR 9612317 B1 | HCAPLUS |
| Anon | 1997 | | | WO 9721538 | HCAPLUS |
| Anon | 1998 | | | WO 9847196 | HCAPLUS |
| Anon | 1999 | | | WO 9943034 | HCAPLUS |
| Anon | 2000 | | | WO 0008234 | HCAPLUS |
| Bates | 1994 | | | US 5314765 A | HCAPLUS |
| Bates | 1994 | | | US 5338625 A | HCAPLUS |

| | | | | |
|---|---|---|---|---|
| Bates | 1996 | | US 5512147 A | HCAPLUS |
| Bates | 1996 | | US 5567210 A | HCAPLUS |
| Bates | 2001 | | US 6218049 B1 | HCAPLUS |
| Brennan | 1990 | | US 4980202 A | HCAPLUS |
| Cable | 1995 | | US 5445903 A | HCAPLUS |
| Chen | 1989 | | US 4837230 A | HCAPLUS |
| Fauteaux | 2002 | | US 20020071992 A1 | |
| Hobson | 1995 | | US 5445906 A | HCAPLUS |
| Huang | 1999 | | US 5948196 A | HCAPLUS |
| Keem | 1993 | | US 5268216 A | |
| Kennedy | 1997 | | US 5682594 A | HCAPLUS |
| Narasimhan | 2001 | | US 20010016273 A1 | |
| Neudecker | 2001 | | US 6168884 B1 | HCAPLUS |
| Steffier | 1995 | | US 5455106 A | HCAPLUS |
| Steffier | 1996 | | US 5480707 A | HCAPLUS |
| Steffier | 1996 | | US 5545435 A | HCAPLUS |
| Steffier | 1996 | | US 5558907 A | HCAPLUS |
| Van Den Berg | 2001 | | US 6224968 B1 | HCAPLUS |

L77 ANSWER 7 OF 26 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2003:397141 HCAPLUS
DN 138:371781
TI Fabrication of buried anode lithium thin film secondary **battery**
IN Lee, Se Hee; Tracy, C. Edwin; Liu, Ping
PA Midwest Research Institute, USA
SO PCT Int. Appl., 29 pp.
CODEN: PIXXD2
DT Patent
LA English
FAN.CNT 1

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|---|---|---|---|---|---|
| PI | WO 2003043108 | A1 | 20030522 | WO 2001-US44025 | 20011113 <-- |
| | W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW | | | | |
| | RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG | | | | |
| | US 2003162094 | A1 | 20030828 | US 2003-110581 | 20030317 <-- |
| | US 6805999 | B2 | 20041019 | | |
| PRAI | WO 2001-US44025 | W | 20011113 <-- | | |

AB The invention relates to a reverse configuration, lithium thin film **battery** having a buried lithium anode layer and process for making the same. The present invention is formed from a precursor composite structure made by depositing **electrolyte** layer onto substrate, followed by sequential deposition of cathode layer and current collector on the **electrolyte** layer. The precursor is subjected to an activation step, wherein a buried lithium anode layer is formed via electroplating a lithium anode layer at the interface of substrate and **electrolyte** film. The electroplating is accomplished by applying a current between anode current collector and cathode current collector.

IT **7440-50-8**, Copper, uses **7440-57-5**, Gold, uses
RL: DEV (Device component use); USES (Uses)
(current collector; fabrication of buried anode lithium thin film secondary **battery**)

RN 7440-50-8 HCAPLUS
CN Copper (7CI, 8CI, 9CI) (CA INDEX NAME)

Cu

RN 7440-57-5 HCAPLUS
CN Gold (8CI, 9CI) (CA INDEX NAME)

Au

IT **184905-46-2, Lithium nitrogen phosphorus oxide**
RL: DEV (Device component use); USES (Uses)
(fabrication of buried anode lithium thin film secondary **battery**)
RN 184905-46-2 HCAPLUS
CN Lithium nitrogen phosphorus oxide (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | x | 17778-88-0 |
| O | x | 17778-80-2 |
| P | x | 7723-14-0 |
| Li | x | 7439-93-2 |

RETABLE

| Referenced Author (RAU) | Year (RPY) | VOL (RVL) | PG (RPG) | Referenced Work (RWK) | Referenced File |
|---|---|---|---|---|---|
| Asami | 1996 | | | US 5489492 A | HCAPLUS |
| Bates | 1994 | | | US 5338625 A | HCAPLUS |
| Hall | 1977 | | | US 4003753 A | HCAPLUS |
| Neudecker | 2001 | | | US 6168884 B1 | HCAPLUS |
| Okada | 2002 | | | US 20020018935 A1 | |
| Saidi | 2000 | | | US 6048645 A | HCAPLUS |
| Sung | 2000 | | | US 6090504 A | HCAPLUS |
| Tadiran Ltd | 1995 | | | EP 0689260 A1 | HCAPLUS |

L77 ANSWER 8 OF 26 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2003:306576 HCAPLUS
DN 139:182767
TI Li3PO4:N/LiCoO2 coatings for thin film **batteries**
AU Gross, M. E.; Martin, P. M.; Stewart, D. C.; Johnston, J. W.; Windisch, C. F.; Graff, G. L.; Rissmiller, P. L.; Dudeck, E. L.
CS Pacific Northwest National Laboratory, Richland, WA, USA
SO Annual Technical Conference Proceedings - Society of Vacuum Coaters ( **2002**), 45th, 119-124
CODEN: ATCCDI; ISSN: 0731-1699
PB Society of Vacuum Coaters
DT Journal
LA English
AB Li3PO4:N (LIPON)/Li1.04CoO2 thin film **battery** structures were deposited up to 2 μm thick were deposited using a 15.2 cm diameter Li2.9PO3.5 pressed powder target for reactive RF magnetron sputtering. Li1.04CoO2 thin films were deposited using a 15.2 cm diameter LiCoO2 pressed

powder target. LIPON films were deposited in an ultra pure N2 atmosphere and LiCoO2 films were deposited in an ultra pure atmospheric of Ar + O2. Total chamber pressure during deposition ranged between 5 and 20 mtorr and RF power to the sputtering targets ranged from 100 W to 450 W. Because XPS gave ambiguous compositional results, the films were optimized for a.c. and d.c. conductivity Elec. conductivity was extremely sensitive to deposition conditions, deposition rate, sputtering gas pressure, and reactive gas partial pressure. AC conductivity measurements were made at a frequency of 10 kHz, and were correlated to d.c. conductivity measurements. LIPON films had the highest conductivities in the 660 nS cm-1 range and the highest a.c. conductivity of Li1.04CoO2 films was .apprx.0.24 S cm-1. Earlier work showed the most conductive films were deposited at 20 mtorr pressures and target powers of 100 W. This work has scaled up to conductive films being deposited at 7.5 mtorr pressures and target powers of 400 W. X-ray diffraction anal. showed that the films were mostly amorphous. Films deposited under these conditions were transparent at visible wavelengths with a refractive index of 1.6. Lower conductivity films were brownish in appearance and had less transmission than films with high conductivity The rechargeable **battery** structure consisting of an alumina substrate, gold current collector, 0.5-μm Li1.04CoO2 cathode, 1.2-μm LIPON **electrolyte**, Li metal anode, and a copper current collector are currently under test. Early thin film **battery** cycle testing was successful, addnl. testing is on-going. Performance results are correlated with film properties and reported. Future work will involve optimization of **battery** performance on a large scale and scale up of the deposition process to include flexible web processing.

IT **203402-92-0P**, Lithium nitride phosphate
RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(LIPON, sputtered layer; Li3PO4:N/LiCoO2 coatings for thin film secondary **batteries**)

RN 203402-92-0 HCAPLUS
CN Lithium nitride phosphate (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | x | 17778-88-0 |
| O4P | x | 14265-44-2 |
| Li | x | 7439-93-2 |

IT **7440-32-6**, Titanium, uses
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses)
(coated substrate; Li3PO4:N/LiCoO2 coatings for thin film secondary **batteries**)

RN 7440-32-6 HCAPLUS
CN Titanium (8CI, 9CI) (CA INDEX NAME)

Ti

IT **7440-50-8**, Copper, uses
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses)
(gold-coated, coated substrate, and anode; Li3PO4:N/LiCoO2 coatings for thin film secondary **batteries**)

RN 7440-50-8 HCAPLUS
CN Copper (7CI, 8CI, 9CI) (CA INDEX NAME)

Cu

IT **7440-57-5**, Gold, uses
RL: DEV (Device component use); USES (Uses)
(substrate coating; Li3PO4:N/LiCoO2 coatings for thin film secondary **batteries**)
RN 7440-57-5 HCAPLUS
CN Gold (8CI, 9CI) (CA INDEX NAME)

Au

RETABLE

| Referenced Author (RAU) | Year (RPY) | VOL (RVL) | PG (RPG) | Referenced Work (RWK) | Referenced File |
|---|---|---|---|---|---|
| Bates, J | 1996 | A14 | 34 | J Vac Sci Technol | |
| Bates, J | 1992 | 53-56 | 647 | Solid State Ionics | HCAPLUS |
| Bates, J | 2000 | 135 | 33 | Solid State Ionics | HCAPLUS |
| Dudney, N | 1999 | 4 | 479 | Curr Opin Solid Stat | |
| Dudney, N | 1993 | A11 | 377 | J Vac Sci Technol | |
| John, B | 1993 | 76 | 929 | J Amer Ceramic Soc | |
| Martin, P | 1997 | 15 | 1098 | J Vac Sci Technol A | HCAPLUS |

L77 ANSWER 9 OF 26 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2003:221965 HCAPLUS
DN 138:240682
TI Encapsulated alloy electrodes for **batteries**
IN Visco, Steven J.; Nimon, Yevgeniy S.; Katz, Bruce D.
PA Polyplus Battery Company, USA
SO PCT Int. Appl., 39 pp.
CODEN: PIXXD2
DT Patent
LA English
FAN.CNT 1

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|---|---|---|---|---|---|
| PI | WO 2003023879 | A2 | 20030320 | WO 2002-US28189 | 20020904 <-- |
| | WO 2003023879 | A3 | 20040212 | | |
| | W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW | | | | |
| | RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG | | | | |
| | US 2003088971 | A1 | 20030515 | US 2002-189908 | 20020703 <-- |
| | US 6991662 | B2 | 20060131 | | |
| | AU 2002331811 | A1 | 20030324 | AU 2002-331811 | 20020904 <-- |
| PRAI | US 2001-318552P | P | 20010910 <-- | | |
| | US 2002-189908 | A | 20020703 <-- | | |
| | WO 2002-US28189 | W | 20020904 <-- | | |

AB Disclosed are methods for forming active metal **battery** alloy

electrodes having protective layers ("encapsulated electrodes"). Charged and uncharged encapsulated alloy electrodes and methods for their fabrication are provided.

IT **7440-50-8**, Copper, uses
RL: DEV (Device component use); USES (Uses)
(encapsulated alloy electrodes for **batteries**)

RN 7440-50-8 HCAPLUS
CN Copper (7CI, 8CI, 9CI) (CA INDEX NAME)

Cu

IT **184905-46-2, Lithium nitrogen phosphorus oxide**
RL: TEM (Technical or engineered material use); USES (Uses)
(glass barrier layer; encapsulated alloy electrodes for **batteries**)

RN 184905-46-2 HCAPLUS
CN Lithium nitrogen phosphorus oxide (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | x | 17778-88-0 |
| O | x | 17778-80-2 |
| P | x | 7723-14-0 |
| Li | x | 7439-93-2 |

L77 ANSWER 10 OF 26 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2002:803448 HCAPLUS
DN 138:207686
TI Electron-beam-directed vapor deposition of multifunctional structures for electrochemical storage
AU Queheillalt, Douglas T.; Hass, Derek D.; Wadley, Haydn N. G.
CS Dep. Materials Sci. and Eng., Univ. of Virginia, Charlottesville, VA, USA
SO Proceedings of SPIE-The International Society for Optical Engineering (**2002**), 4698(Industrial and Commercial Applications of Smart Structures Technologies), 201-211
CODEN: PSISDG; ISSN: 0277-786X
PB SPIE-The International Society for Optical Engineering
DT Journal
LA English
AB Multifunctional structures combine load-bearing support in addition to other functions such as mech. actuation, distributed power supply or thermal management. Electron beam vapor deposition was used to study deposition methodologies for two multifunctional **battery** concepts: a linear/truss-based nickel-metal hydride and a fiber-based solid-state Li-ion multifunctional **battery**. Porous Ni cathode coatings and porous rare earth (misch) metal coatings based on La and Ni (AB5 alloys) or Ti and Zr (AB2 alloys) for anodes were studied for the nickel-metal hydride system. For the Li+-based system, LiV2O5 (cathode), LiPON (solid **electrolyte**), and Sn3N4 (anode) were studied. Electron beam vapor deposition was used for deposition of all cathode and anode structures to provide an economical method for the development of these novel multifunctional structures.

IT **7440-02-0**, Nickel, uses
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses)

(cathode; electron beam vapor deposition of nickel cathode for multifunctional structures of **batteries**)
RN 7440-02-0 HCAPLUS
CN Nickel (8CI, 9CI) (CA INDEX NAME)

Ni

IT **184905-46-2D, Lithium nitrogen phosphorus oxide**, oxygen-deficient
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses)
(**electrolyte**; electron beam vapor deposition of **lithium nitrogen phosphorus oxide** for multifunctional structures of **batteries**)
RN 184905-46-2 HCAPLUS
CN Lithium nitrogen phosphorus oxide (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | x | 17778-88-0 |
| O | x | 17778-80-2 |
| P | x | 7723-14-0 |
| Li | x | 7439-93-2 |

RETABLE

| Referenced Author (RAU) | Year (RPY) | VOL (RVL) | PG (RPG) | Referenced Work (RWK) | Referenced File |
|---|---|---|---|---|---|
| Anderson, I | 1998 | 496 | 37 | Mat Res Soc Symp Pro | HCAPLUS |
| Anon | 1995 | | | Handbook of Batterie | |
| Anon | 1999 | | | Handbook of Battery | |
| Anon | 1997 | | | The Handbook of Sand | |
| Atwater, T | 2000 | 91 | 27 | J Power Sources | HCAPLUS |
| Bates, J | 1995 | 54 | 58 | J Power Sources | HCAPLUS |
| Bates, J | 2000 | 135 | 33 | Solid State Ionics | HCAPLUS |
| Bird, G | 1994 | | | Molecular Gas Dynami | |
| Boone, B | 1999 | 81-82 | 150 | J Power Sources | |
| Dudney, N | 1999 | 4 | 479 | Current Opinion in S | |
| Groves, J | 2000 | 16 | 461 | Surface Engineering | HCAPLUS |
| Groves, J | 2001 | 2 | 25 | Vacuum Technology & | |
| Hass, D | 2000 | | | PhD dissertation, "D | |
| Katz, H | 1998 | 72 | 43 | J Power Sources | HCAPLUS |
| Kleperis, J | 2001 | 5 | 229 | J Solid State Electr | HCAPLUS |
| Oman, H | 1999 | 24 | 33 | MRS Bulliten | HCAPLUS |
| Owens, B | 2000 | 90 | 2 | J Power Sources | HCAPLUS |
| Sastry, A | 1998 | 120 | 280 | J of Engr Mater & Te | HCAPLUS |
| Shiller, S | 1995 | | | Electron Beam Techno | |
| Shukla, A | 2001 | 100 | 125 | J Power Sources | HCAPLUS |
| Sypeck, D | 2001 | 16 | 890 | J Mater Res | HCAPLUS |
| Tarascon, J | 2001 | 414 | 359 | Nature | HCAPLUS |
| Thornton, J | 1977 | 7 | 239 | Ann Rev Mater Sci | HCAPLUS |
| Vincent, C | 2000 | 134 | 159 | Solid State Ionics | HCAPLUS |
| Wadley, H | | | | US 5534314 | HCAPLUS |
| Wakihara, M | 2001 | 33 | 109 | Mater Sci and Engr R | |
| Yoda, S | 1999 | 81-82 | 162 | J Power Sources | HCAPLUS |

L77 ANSWER 11 OF 26 HCAPLUS COPYRIGHT 2006 ACS on STN

AN 2002:538496 HCAPLUS
DN 137:111659
TI Thin inorganic solid **electrolyte** film and lithium **battery** component thereof
IN Kugai, Yuichi; Ota, Yukihiro; Yamanaka, Shosaku
PA Sumitomo Electric Industries, Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 5 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

| PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|---|---|---|---|---|
| PI JP 2002203593 | A2 | 20020719 | JP 2000-337406 | 20001106 <-- |
| PRAI JP 2000-323108 | A | 20001023 <-- | | |

AB The **electrolyte** film has a composition containing Li, S, Ag, and elements selected from P, Si, B, Ge, and Ga. The Li **battery** component has the **electrolyte** film formed on a Li or Li containing alloy layer, and is used as **battery** anode.
IT **7440-22-4**, Silver, uses **443129-93-9**, Lithium metaphosphate nitride oxide (Li3(PO3)N0.1O0.9)
RL: DEV (Device component use); USES (Uses)
(compns. of silver containing solid inorg. **electrolyte** films on anodes for secondary lithium **batteries**)
RN 7440-22-4 HCAPLUS
CN Silver (8CI, 9CI) (CA INDEX NAME)

RN 443129-93-9 HCAPLUS
CN Lithium metaphosphate nitride oxide (Li3(PO3)N0.1O0.9) (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | 0.1 | 17778-88-0 |
| O | 0.9 | 17778-80-2 |
| O3P | 1 | 15389-19-2 |
| Li | 3 | 7439-93-2 |

L77 ANSWER 12 OF 26 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2002:502703 HCAPLUS
DN 137:65723
TI Layered arrangements of lithium anodes for **batteries**
IN Chu, May-Ying; Visco, Steven J.; Dejonghe, Lutgard C.
PA Polyplus Battery Company, USA
SO U.S., 25 pp., Cont.-in-part of U.S. Ser. No. 431,190.
CODEN: USXXAM
DT Patent
LA English
FAN.CNT 3

| PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|---|---|---|---|---|
| PI US 6413285 | B1 | 20020702 | US 2000-640467 | 20000816 <-- |
| US 6413284 | B1 | 20020702 | US 1999-431190 | 19991101 <-- |
| CA 2387796 | AA | 20010510 | CA 2000-2387796 | 20001027 <-- |

```
     WO 2001033651          A1     20010510    WO 2000-US29732         20001027 <--
         W:  AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN,
             CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR,
             HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT,
             LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU,
             SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU,
             ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM
         RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY,
             DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ,
             CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG
     EP 1230694             A1     20020814    EP 2000-973968          20001027 <--
         R:  AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT,
             IE, SI, LT, LV, FI, RO, MK, CY, AL
     BR 2000015111          A      20021126    BR 2000-15111           20001027 <--
     JP 2003529895          T2     20031007    JP 2001-535247          20001027 <--
     AU 779944              B2     20050217    AU 2001-12407           20001027 <--
     WO 2002015301          A2     20020221    WO 2001-US24342         20010802 <--
     WO 2002015301          A3     20020926
     WO 2002015301          C2     20030403
         W:  AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN,
             CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR,
             HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT,
             LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU,
             SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN,
             YU, ZA, ZW
         RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AM, AZ, BY, KG,
             KZ, MD, RU, TJ, TM, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR,
             IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN,
             GQ, GW, ML, MR, NE, SN, TD, TG
     AU 2001081022          A5     20020225    AU 2001-81022           20010802 <--
     US 2002034688          A1     20020321    US 2001-999673          20011030 <--
     US 6737197             B2     20040518
PRAI US 1999-431190         A2     19991101  <--
     US 2000-640467         A      20000816  <--
     WO 2000-US29732        W      20001027  <--
     WO 2001-US24342        W      20010802  <--
AB   A method employing a bonding layer is used to form active metal electrodes
     having barrier layers.  Active metals such as lithium are highly reactive
     in ambient conditions.  The method involves fabricating a lithium
     electrode or other active metal electrode without depositing the barrier
     layer on a layer of metal.  Rather a smooth barrier layer is formed on a
     smooth substrate such as a web carrier or polymeric electrolyte.
     A bonding or alloying layer is formed on top of the barrier layer.
     Lithium or other active material is then attached to the bonding layer to
     form the active metal electrode.  A current collector may also be attached
     to the lithium or active metal during the process.
IT   7439-96-5, Manganese, uses 7440-22-4, Silver, uses
     7440-32-6, Titanium, uses
     RL: TEM (Technical or engineered material use); USES (Uses)
        (foil bonding layer; layered arrangements of lithium anodes for
        batteries)
RN   7439-96-5  HCAPLUS
CN   Manganese (8CI, 9CI)  (CA INDEX NAME)


Mn


RN   7440-22-4  HCAPLUS
CN   Silver (8CI, 9CI)  (CA INDEX NAME)
```

Ag

RN 7440-32-6 HCAPLUS
CN Titanium (8CI, 9CI) (CA INDEX NAME)

Ti

IT **184905-46-2, Lithium nitrogen phosphorus oxide**
RL: TEM (Technical or engineered material use); USES (Uses)
(glass, barrier layer; layered arrangements of lithium anodes for **batteries**)
RN 184905-46-2 HCAPLUS
CN Lithium nitrogen phosphorus oxide (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | x | 17778-88-0 |
| O | x | 17778-80-2 |
| P | x | 7723-14-0 |
| Li | x | 7439-93-2 |

IT **7439-89-6**, Iron, uses **7440-50-8**, Copper, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(releasable web carrier; layered arrangements of lithium anodes for **batteries**)
RN 7439-89-6 HCAPLUS
CN Iron (7CI, 8CI, 9CI) (CA INDEX NAME)

Fe

RN 7440-50-8 HCAPLUS
CN Copper (7CI, 8CI, 9CI) (CA INDEX NAME)

Cu

RETABLE

| Referenced Author (RAU) | Year (RPY) | VOL (RVL) | PG (RPG) | Referenced Work (RWK) | Referenced File |
|---|---|---|---|---|---|
| Anon | 1983 | | | EP 0111213 A2 | |
| Anon | 1983 | | | EP 0111214 B1 | HCAPLUS |
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| Anon | 1998 | | | EP 0875951 A1 | HCAPLUS |
| Anon | 1999 | | | EP 0689260 B1 | HCAPLUS |
| Anon | 1997 | | | "R&D Thin Film Techn | |
| Bailey | 1995 | | | US 5409786 A | HCAPLUS |
| Bates | 1994 | | | US 5314765 A | HCAPLUS |
| Bates | 1994 | | | US 5338625 A | HCAPLUS |
| Bates | 1995 | | | US 5455126 A | HCAPLUS |

| | | | | | |
|---|---|---|---|---|---|
| Bates | 1996 | | | US 5512147 A | HCAPLUS |
| Bates | 1996 | | | US 5567210 A | HCAPLUS |
| Bates | 1996 | | | US 5569520 A | HCAPLUS |
| Bates | 1997 | | | US 5597660 A | HCAPLUS |
| Bates | 1997 | | | US 5612152 A | HCAPLUS |
| Bates, J | 1995 | | | Journal of Power Sou | |
| Bates, J | 1992 | | | Solid State Ionics | |
| Cavalloni | 1997 | | | US 5696201 A | HCAPLUS |
| de Neufville | 1991 | | | US 4981672 A | HCAPLUS |
| Dey | 1979 | | | US 4162202 A | |
| Dudney, N | 1992 | | | Solid State Ionics | |
| Helms | 1992 | | | US 5100523 A | HCAPLUS |
| Jones, S | 1994 | | | Solid State Ionics | |
| Koksbang | 1994 | | | US 5342710 A | HCAPLUS |
| Nippon Telegr & Teleph | 1984 | 008 | E-248 | Patent Abstracts of | |
| Skotheim | 1997 | | | US 5648187 A | HCAPLUS |
| Visco | 2000 | | | US 6025094 A | HCAPLUS |
| Yu, X | 1997 | 144 | | J Electrochem Soc | HCAPLUS |

L77 ANSWER 13 OF 26 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2002:195192 HCAPLUS
DN 136:328079
TI Fabrication and testing of all solid-state microscale lithium **batteries** for microspacecraft applications
AU West, W. C.; Whitacre, J. F.; White, V.; Ratnakumar, B. V.
CS Electrochemical Technologies Group/Micro Device Laboratories/Center for Integrated Space Microsystems. Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, 91109, USA
SO Journal of Micromechanics and Microengineering (**2002**), 12(1), 58-62
CODEN: JMMIEZ; ISSN: 0960-1317
PB Institute of Physics Publishing
DT Journal
LA English
AB A microfabrication process has been developed to prepare thin film solid-state lithium **batteries** as small as 50 μm + 50 μm. Individual cells operate nominally at 3.9 V with 10 μA h cm-2 for a 0.25 μm thick cathode film. The cells are easily fabricated in series and parallel arrangement to yield **batteries** with higher voltage and/or capacity. Multiple charge/discharge cycles are possible, though an apparent reaction of the in situ plated Li film with water or oxygen decreases cycle life several orders of magnitude from expected results. Further optimization of an encapsulating film will likely extend the cell cyclability. These **microbattery** arrays will be useful for providing on-chip power for low current, high voltage applications for microspacecraft and other miniaturized systems.
IT **150499-40-4P**, Lithium metaphosphate nitride oxide (Li3.3(PO3)N0.22O0.8)
RL: CPS (Chemical process); DEV (Device component use); PEP (Physical, engineering or chemical process); PNU (Preparation, unclassified); PREP (Preparation); PROC (Process); USES (Uses)
(formation of solid state **electrolyte** for lithium **batteries** for microspacecraft applications by magnetron sputtering of Li3PO4 in N2 atmospheric)
RN 150499-40-4 HCAPLUS
CN Lithium metaphosphate nitride oxide (Li3.3(PO3)N0.22O0.8) (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|

| | | |
|---|---|---|
| N | 0.22 | 17778-88-0 |
| O | 0.8 | 17778-80-2 |
| O3P | 1 | 15389-19-2 |
| Li | 3.3 | 7439-93-2 |

IT **7440-02-0**, Nickel, reactions **7440-06-4**, Platinum, reactions **7440-32-6**, Titanium, reactions
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); RCT (Reactant); PROC (Process); RACT (Reactant or reagent)
(magnetron sputtering in fabrication solid-state microscale lithium **batteries** for microspacecraft applications)
RN 7440-02-0 HCAPLUS
CN Nickel (8CI, 9CI) (CA INDEX NAME)

Ni

RN 7440-06-4 HCAPLUS
CN Platinum (8CI, 9CI) (CA INDEX NAME)

Pt

RN 7440-32-6 HCAPLUS
CN Titanium (8CI, 9CI) (CA INDEX NAME)

Ti

RETABLE

| Referenced Author (RAU) | Year (RPY) | VOL (RVL) | PG (RPG) | Referenced Work (RWK) | Referenced File |
|---|---|---|---|---|---|
| Bates, J | 2000 | 135 | 33 | Solid State Ion | HCAPLUS |
| Birke, P | 1997 | 93 | 1 | Solid State Ion | |
| Hayashi, A | 1999 | 146 | 3472 | J Electrochem Soc | HCAPLUS |
| Jones, S | 1994 | 69 | 357 | Solid State Ion | HCAPLUS |
| LaFollette, R | 2001 | | 349 | Proc Conf IEEE 16th | HCAPLUS |
| Neudecker, B | 2000 | 147 | 517 | J Electrochem Soc | HCAPLUS |
| Takada, K | 2001 | | | US 6210836 | HCAPLUS |
| Wang, B | 1996 | 143 | 3203 | J Electrochem Soc | HCAPLUS |
| Whitacre, J | 2001 | 148 | A1078 | J Electrochem Soc | HCAPLUS |
| Yu, X | 1997 | 144 | 524 | J Electrochem Soc | HCAPLUS |

L77 ANSWER 14 OF 26 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2002:143080 HCAPLUS
DN 136:186681
TI Layered arrangements of lithium anodes for lithium-sulfur **batteries**
IN Chu, May-Ying; Visco, Steven J.; Dejonghe, Lutgard C.
PA Polyplus Battery Company, USA
SO PCT Int. Appl., 51 pp.
CODEN: PIXXD2
DT Patent
LA English
FAN.CNT 3

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|---|---|---|---|---|---|
| PI | WO 2002015301 | A2 | 20020221 | WO 2001-US24342 | 20010802 <-- |
| | WO 2002015301 | A3 | 20020926 | | |
| | WO 2002015301 | C2 | 20030403 | | |
| | W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW | | | | |
| | RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG | | | | |
| | US 6413285 | B1 | 20020702 | US 2000-640467 | 20000816 <-- |
| | AU 2001081022 | A5 | 20020225 | AU 2001-81022 | 20010802 <-- |
| PRAI | US 2000-640467 | A | 20000816 <-- | | |
| | US 1999-431190 | A2 | 19991101 <-- | | |
| | WO 2001-US24342 | W | 20010802 <-- | | |

AB A method employing a bonding layer is used to form active metal electrodes having barrier layers. Active metals such as lithium are highly reactive in ambient conditions. The method involves fabricating a lithium electrode or other active metal electrode without depositing the barrier layer on a layer of metal. Rather a smooth barrier layer is formed on a smooth substrate such as a web carrier or polymeric **electrolyte**. A bonding or alloying layer is formed on top of the barrier layer. Lithium or other active material is then attached to the bonding layer to form the active metal electrode. A current collector may also be attached to the lithium or active metal during the process.

IT **7439-96-5**, Manganese, uses **7440-22-4**, Silver, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(foil bonding layer; layered arrangements of lithium anodes for lithium-sulfur **batteries**)
RN 7439-96-5 HCAPLUS
CN Manganese (8CI, 9CI) (CA INDEX NAME)

Mn

RN 7440-22-4 HCAPLUS
CN Silver (8CI, 9CI) (CA INDEX NAME)

Ag

IT **7439-89-6**, Iron, uses **7440-50-8**, Copper, uses
**184905-46-2, Lithium nitrogen phosphorus oxide**
RL: TEM (Technical or engineered material use); USES (Uses)
(releasable web carrier layer; layered arrangements of lithium anodes for lithium-sulfur **batteries**)
RN 7439-89-6 HCAPLUS
CN Iron (7CI, 8CI, 9CI) (CA INDEX NAME)

Fe

RN 7440-50-8 HCAPLUS
CN Copper (7CI, 8CI, 9CI) (CA INDEX NAME)

Cu

RN 184905-46-2 HCAPLUS
CN Lithium nitrogen phosphorus oxide (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | x | 17778-88-0 |
| O | x | 17778-80-2 |
| P | x | 7723-14-0 |
| Li | x | 7439-93-2 |

L77 ANSWER 15 OF 26 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2002:90544 HCAPLUS
DN 136:137424
TI Fabrication of lithium anodes and **batteries**
IN Skotheim, Terje A.; Sheehan, Christopher J.; Mikhaylik, Yuriy V.; Affinito, John
PA USA
SO U.S. Pat. Appl. Publ., 22 pp., Cont.-in-part of U.S. Ser. No. 721,578.
CODEN: USXXCO
DT Patent
LA English
FAN.CNT 3

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|---|---|---|---|---|---|
| PI | US 2002012846 | A1 | 20020131 | US 2001-864890 | 20010523 <-- |
| | US 6733924 | B1 | 20040511 | US 2000-721519 | 20001121 <-- |
| | US 6797428 | B1 | 20040928 | US 2000-721578 | 20001121 <-- |
| | CN 1728418 | A | 20060201 | CN 2005-10079023 | 20001121 <-- |
| | WO 2002095849 | A2 | 20021128 | WO 2002-US16649 | 20020523 <-- |
| | WO 2002095849 | A3 | 20031204 | | |
| | W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW | | | | |
| | RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG | | | | |
| | AU 2002312067 | A1 | 20021203 | AU 2002-312067 | 20020523 <-- |
| | EP 1407505 | A2 | 20040414 | EP 2002-739419 | 20020523 <-- |
| | EP 1407505 | B1 | 20050803 | | |
| | R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR | | | | |
| | CN 1511351 | A | 20040707 | CN 2002-810473 | 20020523 <-- |
| | JP 2004527888 | T2 | 20040909 | JP 2002-592213 | 20020523 <-- |
| | US 2005008935 | A1 | 20050113 | US 2004-913839 | 20040806 <-- |
| | US 6936381 | B2 | 20050830 | | |
| PRAI | US 1999-167171P | P | 19991123 <-- | | |

| | | | |
|---|---|---|---|
| US 2000-721519 | A2 | 20001121 | <-- |
| US 2000-721578 | A2 | 20001121 | <-- |
| CN 2000-818169 | A3 | 20001121 | <-- |
| US 2001-864890 | A | 20010523 | <-- |
| WO 2002-US16649 | W | 20020523 | <-- |

AB Provided is an anode for use in electrochem. cells, wherein the anode active layer has a first layer comprising lithium metal and a multi-layer structure comprising single ion conducting layers and polymer layers in contact with the first layer comprising lithium metal or in contact with an intermediate protective layer, such as a temporary protective metal layer, on the surface of the lithium-containing first layer. Another aspect of the invention provides an anode active layer formed by the in-situ deposition of lithium vapor and a reactive gas. The anodes of the current invention are particularly useful in electrochem. cells comprising sulfur-containing cathode active materials, such as elemental sulfur.

IT **184905-46-2, Lithium nitrogen phosphorus oxide**
RL: DEV (Device component use); USES (Uses)
(fabrication of lithium anodes and **batteries**)

RN 184905-46-2 HCAPLUS

CN Lithium nitrogen phosphorus oxide (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | x | 17778-88-0 |
| O | x | 17778-80-2 |
| P | x | 7723-14-0 |
| Li | x | 7439-93-2 |

IT **7440-50-8**, Copper, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(fabrication of lithium anodes and **batteries**)

RN 7440-50-8 HCAPLUS

CN Copper (7CI, 8CI, 9CI) (CA INDEX NAME)

Cu

L77 ANSWER 16 OF 26 HCAPLUS COPYRIGHT 2006 ACS on STN

AN 2001:649023 HCAPLUS

DN 136:105010

TI Solid-state thin-film supercapacitor with ruthenium oxide and solid **electrolyte** thin films

AU Yoon, Y. S.; Cho, W. I.; Lim, J. H.; Choi, D. J.

CS Thin Film Technology Research Center, Korea Institute of Science and Technology, Cheongryang, Seoul, 130-650, S. Korea

SO Journal of Power Sources (**2001**), 101(1), 126-129
CODEN: JPSODZ; ISSN: 0378-7753

PB Elsevier Science B.V.

DT Journal

LA English

AB D.c. reactive sputtering deposition of ruthenium oxide thin films (bottom and top electrodes) at 400°C are performed to produce a solid-state thin-film supercapacitor (TFSC). The supercapacitor has a cell structure of RuO2/Li2.94PO2.37N0.75 (Lipon)/RuO2/Pt. Radio frequency, reactive sputtering deposition of an Li2.94PO2.37N0.75 **electrolyte** film is performed on the bottom RuO2 film at room temperature to sep. the bottom and

top RuO2 electrodes elec. The stoichiometry of the RuO2 thin film is investigated by Rutherford back-scattering spectrometry (RBS). X-ray diffraction (XRD) shows that the as-deposited RuO2 thin film is an amorphous phase. SEM measurements reveal that the RuO2/Lipon/RuO2 hetero-interfaces have no inter-diffusion problems. Charge-discharge measurements with constant current at room temperature clearly reveal typical supercapacitor behavior for a RuO2/Lipon/RuO2/Pt cell structure. Since the **electrolyte** thin film has low ionic mobility, the capacity and cycle performance are inferior to those of a bulk type of supercapacitor. A high performance, TFSC can be fabricated by a solid **electrolyte** thin film with high ionic conductivity

IT **7440-06-4**, Platinum, processes **357208-48-1**, Lithium phosphorus nitride oxide (Li2.94PN0.75O2.37)
RL: PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process)
(solid-state thin-film supercapacitor with ruthenium oxide and solid **electrolyte** thin films)

RN 7440-06-4 HCAPLUS
CN Platinum (8CI, 9CI) (CA INDEX NAME)

Pt

RN 357208-48-1 HCAPLUS
CN Lithium phosphorus nitride oxide (Li2.94PN0.75O2.37) (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | 0.75 | 17778-88-0 |
| O | 2.37 | 17778-80-2 |
| P | 1 | 7723-14-0 |
| Li | 2.94 | 7439-93-2 |

RETABLE

| Referenced Author (RAU) | Year (RPY) | VOL (RVL) | PG (RPG) | Referenced Work (RWK) | Referenced File |
|---|---|---|---|---|---|
| Bates, J | 1992 | 53 | 647 | Solid State Ionics | |
| Bispo-Fonseca, I | 1999 | 79 | 238 | J Power Sources | HCAPLUS |
| Bonnefoi, L | 1999 | 80 | 149 | J Power Sources | HCAPLUS |
| Jacobson, A | 1979 | 14 | 1437 | Mater Res Bull | HCAPLUS |
| Jeon, E | 2000 | 3 | 115 | J Korean Electrochem | HCAPLUS |
| Jeon, E | 1999 | 12 | 1019 | J Korean Inst Electr | |
| Kanehori, K | 1983 | 9/10 | 1445 | Solid State Ionics | |
| Kennedy, J | 1977 | 43 | 41 | Thin Solid Films | HCAPLUS |
| Levasseur, A | 1989 | B3 | 5 | Mater Sci Eng | HCAPLUS |
| Levasseur, A | 1983 | 9/10 | 1439 | Solid State Ionics | |
| Sekido, S | 1983 | 9/10 | 777 | Solid State Ionics | |
| Whittingham, M | 1976 | 123 | 315 | J Electrochem Soc | HCAPLUS |
| Yoon, Y | 1999 | 9 | 465 | J Mater Sci (Mater E | |
| Yoon, Y | 1998 | 37 | 7129 | Jpn J Appl Phys | HCAPLUS |
| Zheng, J | 1995 | 142 | 2699 | J Electrochem Soc | HCAPLUS |
| Zheng, J | 1996 | 143 | 1068 | J Electrochem Soc | HCAPLUS |

L77 ANSWER 17 OF 26 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2001:504523 HCAPLUS
DN 135:203785

TI Fabrication and analysis of thin film supercapacitor using a cobalt oxide thin film electrode
AU Kim, Han-Ki; Lim, Jae Hong; Jeon, Eun Jeong; Seong, Tae-Yeon; Cho, Won Il; Yoon, Young Soo
CS Thin Film Technology Research Center & Battery and Fuel Cell Center, Korea Institute of Science and Technology(KIST), Seoul, 130-650, S. Korea
SO Han'guk Chaelyo Hakhoechi (**2001**), 11(5), 339-344
CODEN: HCHAEU; ISSN: 1225-0562
PB Materials Research Society of Korea
DT Journal
LA Korean
AB An all solid-state thin film supercapacitor (TFSC) with Co3O4/LiPON/Co3O4 structure was fabricated on Pt/Ti/Si substrate using Co3O4 thin film electrode. Each Co3C4 film was grown by reactive d.c. reactive magnetron sputtering with increasing O2/[Ar + O2] ratio. Amorphous LiPON **electrolyte** film was deposited on Co3O4/Pt/Ti/Si in pure N ambient by using reactive RF magnetron sputtering. The electrochem. behavior of the Co3O4/LiPON/Co3O4 multi-layer structures exhibits a behavior of a bulk-type supercapacitor, even though much lower capacity (from 5-25 mF/cm2-μm) than that of the bulk 1. It was found that the TFSC showed a fairly constant discharge capacity with a constant current of 50 μA/cm2 at the cut-off voltage 0-2V during 400 cycles. It is shown that the electrochem. behavior of the Co3O4 /LiPON/ Co3O4 TFSC is dependent upon the sputtering gas ratio. The capacity dependency of electrode films on different gas ratios was explained by different structural, elec., and surface properties.
IT **7440-32-6**, Titanium, processes
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(Ti/Si substrate; fabrication and anal. of thin film supercapacitor using a cobalt oxide thin film electrode)
RN 7440-32-6 HCAPLUS
CN Titanium (8CI, 9CI) (CA INDEX NAME)

Ti

IT **7440-06-4**, Platinum, processes
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(d.c. sputtering; fabrication and anal. of thin film supercapacitor using a cobalt oxide thin film electrode)
RN 7440-06-4 HCAPLUS
CN Platinum (8CI, 9CI) (CA INDEX NAME)

Pt

IT **357208-48-1**, Lithium phosphorus nitride oxide (Li2.94PN0.75O2.37)
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(fabrication and anal. of thin film supercapacitor using a cobalt oxide thin film electrode)
RN 357208-48-1 HCAPLUS
CN Lithium phosphorus nitride oxide (Li2.94PN0.75O2.37) (9CI) (CA INDEX NAME)

| Component | Ratio | Component |
|---|---|---|

| | | Registry Number |
|---|---|---|
| N | 0.75 | 17778-88-0 |
| O | 2.37 | 17778-80-2 |
| P | 1 | 7723-14-0 |
| Li | 2.94 | 7439-93-2 |

L77 ANSWER 18 OF 26 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2001:397240 HCAPLUS
DN 135:7792
TI Lithium anodes for electrochemical cells
IN Skotheim, Terje A.; Sheehan, Christopher J.; Mikhaylik, Yuriy V.
PA Moltech Corporation, USA
SO PCT Int. Appl., 41 pp.
CODEN: PIXXD2
DT Patent
LA English
FAN.CNT 3

| PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|---|---|---|---|---|
| PI WO 2001039303 | A1 | 20010531 | WO 2000-US32234 | 20001121 <-- |
| W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW | | | | |
| RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG | | | | |
| AU 2001017967 | A5 | 20010604 | AU 2001-17967 | 20001121 <-- |
| EP 1234348 | A1 | 20020828 | EP 2000-980746 | 20001121 <-- |
| EP 1234348 | B1 | 20031022 | | |
| R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL | | | | |
| JP 2003515893 | T2 | 20030507 | JP 2001-540870 | 20001121 <-- |
| CN 1728418 | A | 20060201 | CN 2005-10079023 | 20001121 <-- |
| PRAI US 1999-167171P | P | 19991123 <-- | | |
| CN 2000-818169 | A3 | 20001121 <-- | | |
| WO 2000-US32234 | W | 20001121 <-- | | |

AB Provided are lithium anodes for use in electrochem. cells, where the anode active layer has a first layer comprising lithium metal and a second layer of a temporary protective material, wherein the temporary protective material is a metal capable of forming an alloy with lithium metal or is capable of diffusing into lithium metal. The present invention also pertains to methods of forming such anodes, electrochem. cells comprising such anodes, and methods of making such cells.

IT **184905-46-2, Lithium nitrogen phosphorus oxide**
RL: TEM (Technical or engineered material use); USES (Uses)
(lithium anodes for electrochem. cells)

RN 184905-46-2 HCAPLUS
CN Lithium nitrogen phosphorus oxide (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | x | 17778-88-0 |
| O | x | 17778-80-2 |

| | | | |
|---|---|---|---|
| P | | x | 7723-14-0 |
| Li | | x | 7439-93-2 |

IT **7440-06-4**, Platinum, uses **7440-22-4**, Silver, uses
**7440-50-8**, Copper, uses **7440-57-5**, Gold, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(temporary protective metal; lithium anodes for electrochem. cells)
RN 7440-06-4 HCAPLUS
CN Platinum (8CI, 9CI) (CA INDEX NAME)

Pt

RN 7440-22-4 HCAPLUS
CN Silver (8CI, 9CI) (CA INDEX NAME)

Ag

RN 7440-50-8 HCAPLUS
CN Copper (7CI, 8CI, 9CI) (CA INDEX NAME)

Cu

RN 7440-57-5 HCAPLUS
CN Gold (8CI, 9CI) (CA INDEX NAME)

Au

RETABLE

| Referenced Author (RAU) | Year (RPY) | VOL (RVL) | PG (RPG) | Referenced Work (RWK) | Referenced File |
|---|---|---|---|---|---|
| Belanger, A | 1995 | | | US 5415954 A | |
| Moltech Corp | 1997 | | | WO 9744840 A | HCAPLUS |
| Skotheim, T | 1995 | | | US 5462566 A | HCAPLUS |
| Skotheim, T | 1997 | | | US 5648187 A | HCAPLUS |

L77 ANSWER 19 OF 26 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2001:338905 HCAPLUS
DN 134:329094
TI Layered arrangements of lithium electrodes having a thin barrier layer
IN Chu, May-Ying; Visco, Steven J.; Dejonghe, Lutgard
PA Polyplus Battery Company, Inc., USA
SO PCT Int. Appl., 51 pp.
CODEN: PIXXD2
DT Patent
LA English
FAN.CNT 3

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|---|---|---|---|---|---|
| PI | WO 2001033651 | A1 | 20010510 | WO 2000-US29732 | 20001027 <-- |

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN,
CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR,

HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT,
LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU,
SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU,
ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY,
DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ,
CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG

| | | | | | |
|---|---|---|---|---|---|
| | US 6413284 | B1 | 20020702 | US 1999-431190 | 19991101 <-- |
| | US 6413285 | B1 | 20020702 | US 2000-640467 | 20000816 <-- |
| | CA 2387796 | AA | 20010510 | CA 2000-2387796 | 20001027 <-- |
| | EP 1230694 | A1 | 20020814 | EP 2000-973968 | 20001027 <-- |
| | R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL | | | | |
| | BR 2000015111 | A | 20021126 | BR 2000-15111 | 20001027 <-- |
| | JP 2003529895 | T2 | 20031007 | JP 2001-535247 | 20001027 <-- |
| | AU 779944 | B2 | 20050217 | AU 2001-12407 | 20001027 <-- |
| PRAI | US 1999-431190 | A | 19991101 <-- | | |
| | US 2000-640467 | A | 20000816 <-- | | |
| | WO 2000-US29732 | W | 20001027 <-- | | |

AB A method employing a bonding layer is used to form metal electrodes with a barrier layer. The method involves fabricating a lithium, or other active material, electrode without depositing a barrier layer on the layer of active material. Rather a smooth barrier layer is formed on a smooth substrate such as a polymeric **electrolyte**. A bonding layer is formed on the barrier layer and the bonding layer is then bonded to the active material.

IT **184905-46-2, Lithium nitrogen phosphorus oxide**
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(barrier layer; layered arrangements of lithium electrodes having thin barrier layer)

RN 184905-46-2 HCAPLUS
CN Lithium nitrogen phosphorus oxide (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | x | 17778-88-0 |
| O | x | 17778-80-2 |
| P | x | 7723-14-0 |
| Li | x | 7439-93-2 |

IT **7439-96-5**, Manganese, uses **7440-22-4**, Silver, uses **7440-32-6**, Titanium, uses
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(bonding layer; layered arrangements of lithium electrodes having thin barrier layer)

RN 7439-96-5 HCAPLUS
CN Manganese (8CI, 9CI) (CA INDEX NAME)

Mn

RN 7440-22-4 HCAPLUS
CN Silver (8CI, 9CI) (CA INDEX NAME)

Ag

RN 7440-32-6 HCAPLUS
CN Titanium (8CI, 9CI) (CA INDEX NAME)

Ti

IT **7439-89-6**, Iron, uses **7440-50-8**, Copper, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(releasable web carrier; layered arrangements of lithium electrodes having thin barrier layer)
RN 7439-89-6 HCAPLUS
CN Iron (7CI, 8CI, 9CI) (CA INDEX NAME)

Fe

RN 7440-50-8 HCAPLUS
CN Copper (7CI, 8CI, 9CI) (CA INDEX NAME)

Cu

RETABLE

| Referenced Author (RAU) | Year (RPY) | VOL (RVL) | PG (RPG) | Referenced Work (RWK) | Referenced File |
|---|---|---|---|---|---|
| Bailey | 1995 | | | US 5409786 A | HCAPLUS |
| Bates | 1994 | | | US 5314765 A | HCAPLUS |
| de Neufville | 1991 | | | US 4981672 A | HCAPLUS |
| Skotheim | 1997 | | | US 5648187 A | HCAPLUS |

L77 ANSWER 20 OF 26 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2001:300177 HCAPLUS
DN 135:36127
TI Pt doping mechanism of vanadium oxide cathode film grown on ITO glass for thin film **battery**
AU Kim, Han-Ki; Seong, Tae-Yeon; Jeon, Eun Jeong; Cho, Won I. I.; Yoon, Young Soo
CS Thin Film Technology Research Center &, Battery and Fuel Cell Research Center Korea, Institute of Science and Technology (KIST), Seoul, 136-791, S. Korea
SO Han'guk Seramik Hakhoechi (**2001**), 38(1), 100-105
CODEN: HSHAF7; ISSN: 1229-7801
PB Korean Ceramic Society
DT Journal
LA English
AB An all solid-state thin film **battery** (TFB) was fabricated by growing, undoped and Pt-doped vanadium oxide cathode film (V2O5) on In2O3:Sn coated glass. Room-temperature charge-discharge measurements based on Li/Lipon/V2O5, full-cell structure with a constant current clearly shows that the Pt-doped V2O5, cathode film is superior, in terms of cyclability. X-ray diffraction (XRD) results indicate that the Pt doping process induces a more random amorphous structure than an undoped V2O5 film. In addition to its modified structure, the Pt-doped V2O5 film has a smoother

surface than the undoped sample. Compared to an undoped V2O5 film, the Pt-doped V2O5 cathode film has a higher electron conductivity We hypothesize that the addition of Pt alters electrochem. performance in a manner of making more random amorphous structure and gives an excess electron by replacing the V+5. Possible mechanisms are discussed for the observed Pt doping effect on structural and electrochem. properties of vanadium oxide cathode films, which are grown on In2O3:Sn coated glass.

IT **7440-06-4**, Platinum, uses
RL: MOA (Modifier or additive use); USES (Uses)
(dopant, vanadium oxide film cathode; effects of Pt doping on structure and charge-discharge properties of vanadium oxide cathode film grown on ITO-coated glass for thin film **battery**)
RN 7440-06-4 HCAPLUS
CN Platinum (8CI, 9CI) (CA INDEX NAME)

Pt

IT **344298-74-4**, Lithium nitride oxide phosphide (Li2.18N0.7O3.1P)
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(**electrolyte**, thin-film **battery**; effects of Pt doping on structure and charge-discharge properties of vanadium oxide cathode film grown on ITO-coated glass for thin film **battery**)
RN 344298-74-4 HCAPLUS
CN Lithium nitride oxide phosphide (Li2.18N0.7O3.1P) (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | 0.7 | 17778-88-0 |
| O | 3.1 | 17778-80-2 |
| P | 1 | 7723-14-0 |
| Li | 2.18 | 7439-93-2 |

L77 ANSWER 21 OF 26 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2001:298779 HCAPLUS
DN 135:36116
TI An analysis of structural characteristics in amorphous vanadium oxide (V2O5) cathode film for thin film **batteries** after cycling by high-resolution electron microscopy (HREM)
AU Kim, Han-Ki; Seong, Tae-Yeon; Jeon, Eun Jeong; Ok, Young-Woo; Cho, Won Ii; Yoon, Young Soo
CS Thin Film Technology Research Center, and Battery and Fuel Cell Center, KIST, Seoul, 130-650, S. Korea
SO Han'guk Seramik Hakhoechi (**2001**), 38(3), 274-279
CODEN: HSHAF7; ISSN: 1229-7801
PB Korean Ceramic Society
DT Journal
LA Korean
AB Amorphous vanadium oxide (a-V2O5) film grown on Pt/Ti/Si substrates have been electrochem. cycled using solid state LiPON **electrolyte**. It was shown that an average capacity of about 15 μAh is kept over >500 cycles. However, the capacity fade starts after a few cycles. To investigate the structural characteristics of amorphous vanadium oxide with Li intercalation-deintercalation, we employed high-resolution electron microscopy (HREM). It was found that as-deposited V2O5 film exhibits a homogeneous amorphous structure; grain boundary or polycryst. structures

are not visible, which is consistent with the transmission electron diffraction (TED) results. After 450 cycles, cross sectional TEM image of the V2O5 film shows that microcryst. vanadium oxide is randomly distributed in the amorphous vanadium oxide cathode film. It was thought that the formation of randomly distributed microcryst. V2O5 in the cathode film results in an irreversible insertion-extraction of Li atoms during electrochem. cycling. In addition to the phase transformation of V2O5, the formation of the crystalline LixV2O5 phase at the interface between vanadium oxide and LiPON **electrolyte** may affect the capacity fade in the cathode film by affecting the Li ion diffusion mobility.

IT **184905-46-2, Lithium nitrogen phosphorus oxide**
RL: PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(**electrolyte**; high-resolution electron microscopy study of structure of amorphous V2O5 cathode film for thin-film **batteries** after cycling with LiPON **electrolyte**)

RN 184905-46-2 HCAPLUS
CN Lithium nitrogen phosphorus oxide (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | x | 17778-88-0 |
| O | x | 17778-80-2 |
| P | x | 7723-14-0 |
| Li | x | 7439-93-2 |

IT **7440-06-4**, Platinum, uses **7440-32-6**, Titanium, uses
RL: NUU (Other use, unclassified); USES (Uses)
(substrates, multilayer; high-resolution electron microscopy study of structure of amorphous V2O5 cathode film for thin-film **batteries** after cycling with LiPON **electrolyte**)

RN 7440-06-4 HCAPLUS
CN Platinum (8CI, 9CI) (CA INDEX NAME)

Pt

RN 7440-32-6 HCAPLUS
CN Titanium (8CI, 9CI) (CA INDEX NAME)

Ti

L77 ANSWER 22 OF 26 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2000:725905 HCAPLUS
DN 133:269464
TI **Battery** with an in-situ activation plated lithium anode
IN Neudecker, Bernd J.; Dudney, Nancy J.; Bates, John B.
PA Lockheed Martin Energy Research Corp., USA
SO PCT Int. Appl., 28 pp.
CODEN: PIXXD2
DT Patent
LA English
FAN.CNT 1

| PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| PI | WO 2000060689 | A1 | 20001012 | WO 2000-US6997 | 20000317 <-- |
| | W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM | | | | |
| | RW: GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG | | | | |
| | US 6168884 | B1 | 20010102 | US 1999-285326 | 19990402 <-- |
| PRAI | US 1999-285326 | A1 | 19990402 <-- | | |

AB A thin-film rechargeable **battery** includes: a cathode film including a lithium transition metal oxide, an **electrolyte** film coupled to the cathode film, the **electrolyte** film being substantially nonreactive with oxidizing materials and with metallic lithium, an anode current collector coupled to the **electrolyte** film; and an overlying layer coupled to the anode current collector. The thin-film rechargeable **battery** is activated during an initial charge by electrochem. plating of a metallic lithium anode between the anode current collector and the **electrolyte** film. The plating of the anode during charging and the stripping of the anode layer during discharging are essentially reversible. Therefore, almost no diminishment of discharge capacity occurs, even after many discharge and charge cycles. Other advantages include no need for special packaging for shipping and handling. The **battery** eliminates the main drawbacks of the thin-film Li-ion **battery** (high capacity loss during the initial charge) and of the thin-film lithium **battery** (high air-sensitivity at all times, temperature limited to .apprx.100°, expensive preparation of the lithium anode). The **battery** survives processing conditions that exceed those of a solder reflow process without any signs of degradation

IT **7439-89-6**, Iron, uses **7439-96-5**, Manganese, uses **7439-98-7**, Molybdenum, uses **7440-02-0**, Nickel, uses **7440-32-6**, Titanium, uses **7440-47-3**, Chromium, uses **7440-48-4**, Cobalt, uses **7440-62-2**, Vanadium, uses
RL: DEV (Device component use); USES (Uses)
(anode grid; **battery** with in-situ activation plated lithium anode)

RN 7439-89-6 HCAPLUS
CN Iron (7CI, 8CI, 9CI) (CA INDEX NAME)

Fe

RN 7439-96-5 HCAPLUS
CN Manganese (8CI, 9CI) (CA INDEX NAME)

Mn

RN 7439-98-7 HCAPLUS
CN Molybdenum (8CI, 9CI) (CA INDEX NAME)

Mo

RN 7440-02-0 HCAPLUS
CN Nickel (8CI, 9CI) (CA INDEX NAME)

Ni

RN 7440-32-6 HCAPLUS
CN Titanium (8CI, 9CI) (CA INDEX NAME)

Ti

RN 7440-47-3 HCAPLUS
CN Chromium (8CI, 9CI) (CA INDEX NAME)

Cr

RN 7440-48-4 HCAPLUS
CN Cobalt (8CI, 9CI) (CA INDEX NAME)

Co

RN 7440-62-2 HCAPLUS
CN Vanadium (8CI, 9CI) (CA INDEX NAME)

V

IT **7440-25-7**, Tantalum, uses **7440-33-7**, Tungsten, uses
**7440-67-7**, Zirconium, uses **184905-46-2**, **Lithium nitrogen phosphorus oxide**
RL: TEM (Technical or engineered material use); USES (Uses)
(overlying layer coupled to anode grid; **battery** with in-situ activation plated lithium anode)
RN 7440-25-7 HCAPLUS
CN Tantalum (8CI, 9CI) (CA INDEX NAME)

Ta

RN 7440-33-7 HCAPLUS
CN Tungsten (8CI, 9CI) (CA INDEX NAME)

W

RN 7440-67-7 HCAPLUS
CN Zirconium (8CI, 9CI) (CA INDEX NAME)

Zr

RN 184905-46-2 HCAPLUS
CN Lithium nitrogen phosphorus oxide (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | x | 17778-88-0 |
| O | x | 17778-80-2 |
| P | x | 7723-14-0 |
| Li | x | 7439-93-2 |

RETABLE

| Referenced Author (RAU) | Year (RPY) | VOL (RVL) | PG (RPG) | Referenced Work (RWK) | Referenced File |
|---|---|---|---|---|---|
| Anon | 1984 | 008 | P-280 | PATENT ABSTRACTS OF | |
| Anon | 1998 | 1998 | | PATENT ABSTRACTS OF | |
| Barker, J | 1999 | | | US 5871865 A | HCAPLUS |
| Bates, J | 1997 | | | US 5612152 A | HCAPLUS |
| Hitachi Seisakusho Kk | 1984 | | | JP 59032023 A | |
| Japan Storage Battery C | 1997 | | | JP 09259929 A | HCAPLUS |
| Matsushita Electric Ind | 1998 | | | EP 0829913 A | HCAPLUS |
| Ovonic Battery Co | 1995 | | | WO 9514311 A | HCAPLUS |
| Technology Finance Corp | 1992 | | | GB 2251119 A | HCAPLUS |

L77 ANSWER 23 OF 26 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2000:413491 HCAPLUS
DN 133:107366
TI A study of electronic shorting in IBDA-deposited Lipon films
AU Vereda, F.; Clay, N.; Gerouki, A.; Goldner, R. B.; Haas, T.; Zerigian, P.
CS Electro-Optics Technology Center, Tufts University, Medford, MA, 02155, USA
SO Journal of Power Sources (**2000**), 89(2), 201-205
CODEN: JPSODZ; ISSN: 0378-7753
PB Elsevier Science S.A.
DT Journal
LA English
AB Because a near term goal of our research is to obtain optimal performance LiCoO2/**lithium phosphorus oxynitride** (Lipon)/C thin film **batteries**, and due to the major importance of the **electrolyte** in any **battery**, we have recently been attempting to better understand the causes of electronic shorting in our Lipon **electrolyte** films. After studying the residual and temperature-dependent stress of these films and observing cracking after they had undergone a temperature change from 300° to room temperature, we adopted a model in which the thermal expansion coefficient mismatch between Lipon and our glass substrates accounted for the cracking and therefore led to the shorting. This model was also supported by evidence that Al films (which had thermal expansion coeffs. close to that of Lipon and proved to act as "buffer layers" by preventing cracking of Lipon when glass/Al/Lipon structures were cooled from 300° to room temperature) were successfully used to produce short-free Al/Lipon/Al devices.
IT **184905-46-2, Lithium nitrogen phosphorus oxide**
RL: DEV (Device component use); USES (Uses)
(electronic shorting in ion beam directed assembly-deposited **lithium phosphorus oxynitride** films)

RN 184905-46-2 HCAPLUS
CN Lithium nitrogen phosphorus oxide (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | x | 17778-88-0 |
| O | x | 17778-80-2 |
| P | x | 7723-14-0 |
| Li | x | 7439-93-2 |

IT **7440-06-4**, PLatinum, uses
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(electronic shorting in ion beam directed assembly-deposited **lithium phosphorus oxynitride** films)
RN 7440-06-4 HCAPLUS
CN Platinum (8CI, 9CI) (CA INDEX NAME)

Pt

RETABLE

| Referenced Author (RAU) | Year (RPY) | VOL (RVL) | PG (RPG) | Referenced Work (RWK) | Referenced File |
|---|---|---|---|---|---|
| Anon | 1980 | | | Handbook of Chemistr | |
| Aoki, T | 1989 | 28 | 299 | Jpn J Appl Phys | |
| Bates, J | 1993 | 43 | 103 | 6th International Me | HCAPLUS |
| Corning Glass Works | | | | Properties of Cornin | |
| Goldner, R | 1999 | 98-15 | 268 | Electrochem Soc, Pro | HCAPLUS |
| Larson, R | 1986 | 88 | 113 | J Non-Cryst Solids | |
| Ohring, M | 1992 | | | The Materials Scienc | |
| Yu, X | 1997 | 144 | 524 | J Electrochem Soc | HCAPLUS |

L77 ANSWER 24 OF 26 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2000:131295 HCAPLUS
DN 132:183034
TI "Lithium-free" thin-film **battery** with in situ plated Li anode
AU Neudecker, B. J.; Dudney, N. J.; Bates, J. B.
CS Oak Ridge National Laboratory, Solid State Division, Oak Ridge, TN, 37831-6030, USA
SO Journal of the Electrochemical Society (**2000**), 147(2), 517-523
CODEN: JESOAN; ISSN: 0013-4651
PB Electrochemical Society
DT Journal
LA English
AB The "Li-free" thin-film **battery** with the cell configuration Li diffusion blocking overlayer/Cu/solid lithium **electrolyte** (Lipon)/LiCoO2 is activated by in situ plating of metallic Li at the Cu anode current collector during the initial charge. Electrochem. cycling between 4.2 and 3.0 V is demonstrated over 1000 cycles at 1 mA/cm2 or over 500 cycles at 5 mA/cm2. As corroborated by SEM during electrochem. cycling, the overlayer is imperative for a high cycle stability; otherwise the plated Li rapidly develops a detrimental morphol., and the **battery** loses most of its capacity within a few cycles. The Li-free thin-film **battery** retains the high potential of a Li cell while permitting its fabrication in air without the complications of a metallic Li anode. Thus, the Li-free thin-film **battery**

survives solder reflow conditions, simulated by a rapid heating to 250° for 10 min in air followed by quenching to room temperature, without any signs of degradation

IT **7440-50-8**, Copper, uses
RL: DEV (Device component use); USES (Uses)
(anode current collector; lithium-free thin-film **battery** with in situ plated Li anode)
RN 7440-50-8 HCAPLUS
CN Copper (7CI, 8CI, 9CI) (CA INDEX NAME)

Cu

IT **203402-92-0**, Lithium nitride phosphate
RL: DEV (Device component use); USES (Uses)
(**electrolyte**; lithium-free thin-film **battery** with in situ plated Li anode)
RN 203402-92-0 HCAPLUS
CN Lithium nitride phosphate (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | x | 17778-88-0 |
| O4P | x | 14265-44-2 |
| Li | x | 7439-93-2 |

RETABLE

| Referenced Author (RAU) | Year (RPY) | VOL (RVL) | PG (RPG) | Referenced Work (RWK) | Referenced File |
|---|---|---|---|---|---|
| Arakawa, M | 1993 | 43-44 | 27 | J Power Sources | |
| Arakawa, M | 1993 | 43-44 | 27 | J Power Sources | |
| Aurbach, D | 1996 | 143 | 3525 | J Electrochem Soc | HCAPLUS |
| Aurbach, D | 1997 | 144 | 3355 | J Electrochem Soc | HCAPLUS |
| Bates, J | 1996 | | | US 5561004 | |
| Bates, J | 1995 | 142 | L149 | J Electrochem Soc | HCAPLUS |
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| Neudecker, B | | | | Int Pat Appl PCT/US9 | |
| Neudecker, B | 1998 | 145 | 4148 | J Electrochem Soc | HCAPLUS |
| Neudecker, B | 1998 | 145 | 4160 | J Electrochem Soc | HCAPLUS |
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| | | | | | |
|---|---|---|---|---|---|
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| Retoux, R | 1999 | 146 | 2472 | J Electrochem Soc | HCAPLUS |
| Selim, R | 1974 | 121 | 1457 | J Electrochem Soc | HCAPLUS |
| Sharma, R | 1976 | 123 | 1763 | J Electrochem Soc | HCAPLUS |
| Smith, D | 1987 | | | US 4713151 | HCAPLUS |
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| Yamaki, J | 1998 | 74 | 219 | J Power Sources | HCAPLUS |
| Yu, X | 1997 | 144 | 524 | J Electrochem Soc | HCAPLUS |

L77 ANSWER 25 OF 26 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 1999:723300 HCAPLUS
DN 131:312496
TI Encapsulated lithium electrodes having glass protective layers and method for their preparation
IN Visco, Steve J.; Tsang, Floris Y.
PA Polyplus Battery Company, Inc., USA
SO PCT Int. Appl., 33 pp.
CODEN: PIXXD2
DT Patent
LA English
FAN.CNT 15

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|---|---|---|---|---|---|
| PI | WO 9957770 | A1 | 19991111 | WO 1999-US6895 | 19990329 <-- |
| | W: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW | | | | |
| | RW: GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG | | | | |
| | US 6214061 | B1 | 20010410 | US 1998-139601 | 19980825 <-- |
| | CA 2330293 | AA | 19991111 | CA 1999-2330293 | 19990329 <-- |
| | AU 9933713 | A1 | 19991123 | AU 1999-33713 | 19990329 <-- |
| | AU 745287 | B2 | 20020321 | | |
| | EP 1093672 | A1 | 20010425 | EP 1999-915119 | 19990329 <-- |
| | EP 1093672 | B1 | 20040825 | | |
| | R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO | | | | |
| | BR 9910109 | A | 20011009 | BR 1999-10109 | 19990329 <-- |
| | JP 2002513991 | T2 | 20020514 | JP 2000-547661 | 19990329 <-- |
| | AT 274752 | E | 20040915 | AT 1999-915119 | 19990329 <-- |
| | US 6432584 | B1 | 20020813 | US 2000-678063 | 20001002 <-- |
| PRAI | US 1998-83947P | P | 19980501 <-- | | |
| | US 1998-139601 | A | 19980825 <-- | | |
| | WO 1999-US6895 | W | 19990329 <-- | | |

AB A method for fabricating an active metal electrode involves depositing lithium or other active metal electrode on a protective layer. The protective layer is a glassy or amorphous material that conducts ions of the active metal. It may be deposited on a releasable web carrier or other substrate such as polymer **electrolyte** layer. Lithium is then deposited on the protective layer. Finally, a current collector is attached to the lithium.
IT **7440-02-0**, Nickel, uses
RL: DEV (Device component use); USES (Uses)
(current collector; encapsulated lithium electrodes having glass protective layers and method for their preparation)
RN 7440-02-0 HCAPLUS
CN Nickel (8CI, 9CI) (CA INDEX NAME)

Ni

IT **184905-46-2, Lithium nitrogen phosphorus oxide**
RL: DEV (Device component use); USES (Uses)
(protective layer containing; encapsulated lithium electrodes having glass protective layers and method for their preparation)
RN 184905-46-2 HCAPLUS
CN Lithium nitrogen phosphorus oxide (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | x | 17778-88-0 |
| O | x | 17778-80-2 |
| P | x | 7723-14-0 |
| Li | x | 7439-93-2 |

IT **7439-89-6**, Iron, uses **7440-50-8**, Copper, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(releasable web carrier; encapsulated lithium electrodes having glass protective layers and method for their preparation)
RN 7439-89-6 HCAPLUS
CN Iron (7CI, 8CI, 9CI) (CA INDEX NAME)

Fe

RN 7440-50-8 HCAPLUS
CN Copper (7CI, 8CI, 9CI) (CA INDEX NAME)

Cu

RETABLE

| Referenced Author (RAU) | Year (RPY) | VOL (RVL) | PG (RPG) | Referenced Work (RWK) | Referenced File |
|---|---|---|---|---|---|
| Bates, J | 1994 | | | US 5314765 A | HCAPLUS |
| Nippon Denshin Denwa Ko | 1984 | | | JP 59031573 A | HCAPLUS |
| Skotheim, T | 1997 | | | US 5648187 A | HCAPLUS |
| Union Carbide Corp | 1984 | | | EP 0111214 A | HCAPLUS |

L77 ANSWER 26 OF 26 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 1999:549496 HCAPLUS
DN 131:146969
TI Plating metal anodes under protective coatings for use in **batteries**
IN Chu, May-Ming; Visco, Steven J.; De Jonghe, Lutgard C.
PA Polyplus Battery Company, Inc., USA
SO PCT Int. Appl., 40 pp.
CODEN: PIXXD2
DT Patent
LA English
FAN.CNT 15

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|---|---|---|---|---|---|
| PI | WO 9943034 | A1 | 19990826 | WO 1999-US3335 | 19990217 <-- |
| | W: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW | | | | |
| | RW: GH, GM, KE, LS, MW, SD, SZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG | | | | |
| | US 6402795 | B1 | 20020611 | US 1998-139603 | 19980825 <-- |
| | CA 2322131 | AA | 19990826 | CA 1999-2322131 | 19990217 <-- |
| | AU 9932959 | A1 | 19990906 | AU 1999-32959 | 19990217 <-- |
| | AU 743685 | B2 | 20020131 | | |
| | BR 9908010 | A | 20001024 | BR 1999-8010 | 19990217 <-- |
| | EP 1057222 | A1 | 20001206 | EP 1999-934368 | 19990217 <-- |
| | R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, LV, FI | | | | |
| | JP 2002504741 | T2 | 20020212 | JP 2000-532875 | 19990217 <-- |
| PRAI | US 1998-75017P | P | 19980218 <-- | | |
| | US 1998-139603 | A | 19980825 <-- | | |
| | WO 1999-US3335 | W | 19990217 <-- | | |

AB A method for forming lithium electrodes having protective layers involves plating lithium between a lithium ion conductive protective layer and a current collector of an electrode precursor. The electrode precursor is formed by depositing the protective layer on a very smooth surface of a current collector. The protective layer is a glass such as **lithium phosphorus oxynitride** and the current collector is a conductive sheet such as a copper sheet. During plating, lithium ions move through the protective layer and a lithium metal layer plates onto the surface of the current collector. The resulting structure is a protected lithium electrode. To facilitate uniform lithium plating, the electrode precursor may include a wetting layer which coats the current collector.

IT **7440-22-4**, Silver, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(anode precursor, wetting layer material; plating metal anodes under protective coatings for use in **batteries**)
RN 7440-22-4 HCAPLUS
CN Silver (8CI, 9CI) (CA INDEX NAME)

Ag

IT **7440-02-0**, Nickel, uses **7440-50-8**, Copper, uses
RL: DEV (Device component use); USES (Uses)
(current collector; plating metal anodes under protective coatings for use in **batteries**)
RN 7440-02-0 HCAPLUS
CN Nickel (8CI, 9CI) (CA INDEX NAME)

Ni

RN 7440-50-8 HCAPLUS
CN Copper (7CI, 8CI, 9CI) (CA INDEX NAME)

Cu

IT **184905-46-2, Lithium nitrogen phosphorus oxide**
RL: TEM (Technical or engineered material use); USES (Uses)
(protective layer; plating metal anodes under protective coatings for use in **batteries**)
RN 184905-46-2 HCAPLUS
CN Lithium nitrogen phosphorus oxide (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | x | 17778-88-0 |
| O | x | 17778-80-2 |
| P | x | 7723-14-0 |
| Li | x | 7439-93-2 |

RETABLE

| Referenced Author (RAU) | Year (RPY) | VOL (RVL) | PG (RPG) | Referenced Work (RWK) | Referenced File |
|---|---|---|---|---|---|
| Bates, J | 1994 | | | US 5314765 A | HCAPLUS |
| De Neufville, J | 1991 | | | US 4981672 A | HCAPLUS |
| Dey Arabinda, N | 1979 | | | US 4162202 A | |
| Matsushita Electric Ind | 1998 | | | EP 0875951 A | HCAPLUS |
| May-Ying, C | 1997 | | | US 5686201 A | HCAPLUS |
| Tadiran Ltd | 1995 | | | EP 0689260 A | HCAPLUS |

=> fil reg
FILE 'REGISTRY' ENTERED AT 06:45:18 ON 26 SEP 2006
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PLEASE SEE "HELP USAGETERMS" FOR DETAILS.


Property values tagged with IC are from the ZIC/VINITI data file provided by InfoChem.

STRUCTURE FILE UPDATES: 25 SEP 2006 HIGHEST RN 908487-18-3
DICTIONARY FILE UPDATES: 25 SEP 2006 HIGHEST RN 908487-18-3

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TSCA INFORMATION NOW CURRENT THROUGH June 30, 2006

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REGISTRY includes numerically searchable data for experimental and predicted properties as well as tags indicating availability of experimental property data in the original document. For information on property searching in REGISTRY, refer to:

http://www.cas.org/ONLINE/UG/regprops.html

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L79 ANSWER 1 OF 11 REGISTRY COPYRIGHT 2006 ACS on STN
RN **871836-55-4** REGISTRY
ED Entered STN: 12 Jan 2006
CN Iron lithium nitride phosphate (FeLiN0.2(PO4)) (9CI) (CA INDEX NAME)
MF **Fe . Li . N . O4 P**
AF **Fe Li N0.2 O4 P**
CI TIS
SR CA
LC STN Files: CA, CAPLUS

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | 0.2 | 17778-88-0 |
| O4P | 1 | 14265-44-2 |
| Li | 1 | 7439-93-2 |
| Fe | 1 | 7439-89-6 |

1 REFERENCES IN FILE CA (1907 TO DATE)
1 REFERENCES TO NON-SPECIFIC DERIVATIVES IN FILE CA
1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 144:72220

L79 ANSWER 2 OF 11 REGISTRY COPYRIGHT 2006 ACS on STN
RN **852709-57-0** REGISTRY
ED Entered STN: 22 Jun 2005
CN Lithium metaphosphate nitride oxide (Li2.9(PO3)N0.36O0.3) (9CI) (CA INDEX NAME)
OTHER NAMES:
CN Lithium phosphorus nitride oxide (Li2.9PN0.36O3.3)
DR 878134-99-7
MF **Li . N . O3 P . O**
AF **Li2.9 N0.36 O3.3 P**
CI TIS
SR CA
LC STN Files: CA, CAPLUS, USPATFULL

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | 0.36 | 17778-88-0 |
| O | 0.3 | 17778-80-2 |
| O3P | 1 | 15389-19-2 |
| Li | 2.9 | 7439-93-2 |

4 REFERENCES IN FILE CA (1907 TO DATE)
4 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 144:277225

REFERENCE 2: 144:277160

REFERENCE 3: 143:46083

REFERENCE 4: 143:29428

L79 ANSWER 3 OF 11 REGISTRY COPYRIGHT 2006 ACS on STN
RN **693781-19-0** REGISTRY
ED Entered STN: 16 Jun 2004

CN Lithium metaphosphate nitride oxide (Li2.8(PO3)N0.300.45) (9CI) (CA INDEX NAME)
DR 816416-48-5
MF **Li . N . O3 P . O**
AF **Li2.8 N0.3 O3.45 P**
CI TIS
SR CA
LC STN Files: CA, CAPLUS, USPATFULL

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | 0.3 | 17778-88-0 |
| O | 0.45 | 17778-80-2 |
| O3P | 1 | 15389-19-2 |
| Li | 2.8 | 7439-93-2 |

**PROPERTY DATA AVAILABLE IN THE 'PROP' FORMAT**

3 REFERENCES IN FILE CA (1907 TO DATE)
3 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 142:97542

REFERENCE 2: 141:74252

REFERENCE 3: 141:9627

L79 ANSWER 4 OF 11 REGISTRY COPYRIGHT 2006 ACS on STN
RN **668998-68-3** REGISTRY
ED Entered STN: 30 Mar 2004
CN Lithium phosphorus nitride oxide (LiPNO) (9CI) (CA INDEX NAME)
MF **Li . N . O . P**
AF **Li N O P**
CI TIS
SR CA
LC STN Files: CA, CAPLUS, USPATFULL

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | 1 | 17778-88-0 |
| O | 1 | 17778-80-2 |
| P | 1 | 7723-14-0 |
| Li | 1 | 7439-93-2 |

5 REFERENCES IN FILE CA (1907 TO DATE)
5 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 144:394637

REFERENCE 2: 141:26164

REFERENCE 3: 140:426171

REFERENCE 4: 140:273561

REFERENCE 5: 140:238499

L79 ANSWER 5 OF 11 REGISTRY COPYRIGHT 2006 ACS on STN
RN **477704-33-9** REGISTRY
ED Entered STN: 24 Dec 2002
CN Lithium nitride oxide phosphide (Li2.9N0.46O3.3P) (9CI) (CA INDEX NAME)
MF **Li . N . O . P**
AF **Li2.9 N0.46 O3.3 P**
CI TIS
SR CA
LC STN Files: CA, CAPLUS, USPAT2, USPATFULL

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | 0.46 | 17778-88-0 |
| O | 3.3 | 17778-80-2 |
| P | 1 | 7723-14-0 |
| Li | 2.9 | 7439-93-2 |

3 REFERENCES IN FILE CA (1907 TO DATE)
3 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 141:246156

REFERENCE 2: 140:96937

REFERENCE 3: 138:15255

L79 ANSWER 6 OF 11 REGISTRY COPYRIGHT 2006 ACS on STN
RN **443129-93-9** REGISTRY
ED Entered STN: 08 Aug 2002
CN Lithium metaphosphate nitride oxide (Li3(PO3)N0.1O0.9) (9CI) (CA INDEX NAME)
MF **Li . N . O3 P . O**
AF **Li3 N0.1 O3.9 P**
CI TIS
SR CA
LC STN Files: CA, CAPLUS

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | 0.1 | 17778-88-0 |
| O | 0.9 | 17778-80-2 |
| O3P | 1 | 15389-19-2 |
| Li | 3 | 7439-93-2 |

1 REFERENCES IN FILE CA (1907 TO DATE)
1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 137:111659

L79 ANSWER 7 OF 11 REGISTRY COPYRIGHT 2006 ACS on STN
RN **357208-48-1** REGISTRY
ED Entered STN: 17 Sep 2001
CN Lithium phosphorus nitride oxide (Li2.94PN0.75O2.37) (9CI) (CA INDEX NAME)
DR 388582-39-6
MF **Li . N . O . P**
AF **Li2.94 N0.75 O2.37 P**
CI TIS

SR CA
LC STN Files: CA, CAPLUS

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | 0.75 | 17778-88-0 |
| O | 2.37 | 17778-80-2 |
| P | 1 | 7723-14-0 |
| Li | 2.94 | 7439-93-2 |

5 REFERENCES IN FILE CA (1907 TO DATE)
5 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 139:284350

REFERENCE 2: 139:71529

REFERENCE 3: 136:105010

REFERENCE 4: 136:30225

REFERENCE 5: 135:203785

L79 ANSWER 8 OF 11 REGISTRY COPYRIGHT 2006 ACS on STN
RN **344298-74-4** REGISTRY
ED Entered STN: 02 Jul 2001
CN Lithium nitride oxide phosphide (Li2.18N0.7O3.1P) (9CI) (CA INDEX NAME)
MF **Li . N . O . P**
AF **Li2.18 N0.7 O3.1 P**
CI TIS
SR CA
LC STN Files: CA, CAPLUS

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | 0.7 | 17778-88-0 |
| O | 3.1 | 17778-80-2 |
| P | 1 | 7723-14-0 |
| Li | 2.18 | 7439-93-2 |

1 REFERENCES IN FILE CA (1907 TO DATE)
1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 135:36127

L79 ANSWER 9 OF 11 REGISTRY COPYRIGHT 2006 ACS on STN
RN **203402-92-0** REGISTRY
ED Entered STN: 01 Apr 1998
CN Lithium nitride phosphate (9CI) (CA INDEX NAME)
MF **Li . N . O4 P**
CI TIS
SR CA
LC STN Files: CA, CAPLUS, USPATFULL

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | x | 17778-88-0 |

| | | |
|---|---|---|
| O4P | x | 14265-44-2 |
| Li | x | 7439-93-2 |

**PROPERTY DATA AVAILABLE IN THE 'PROP' FORMAT**

18 REFERENCES IN FILE CA (1907 TO DATE)
18 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 144:415778

REFERENCE 2: 144:195246

REFERENCE 3: 144:91038

REFERENCE 4: 144:54352

REFERENCE 5: 144:38348

REFERENCE 6: 143:297230

REFERENCE 7: 140:360340

REFERENCE 8: 140:306619

REFERENCE 9: 139:182767

REFERENCE 10: 138:347409

L79 ANSWER 10 OF 11 REGISTRY COPYRIGHT 2006 ACS on STN
RN **184905-46-2** REGISTRY
ED Entered STN: 09 Jan 1997
CN Lithium nitrogen phosphorus oxide (9CI) (CA INDEX NAME)
MF **Li . N . O . P**
CI TIS
SR CA
LC STN Files: CA, CAPLUS, USPAT2, USPATFULL

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | x | 17778-88-0 |
| O | x | 17778-80-2 |
| P | x | 7723-14-0 |
| Li | x | 7439-93-2 |

**PROPERTY DATA AVAILABLE IN THE 'PROP' FORMAT**

97 REFERENCES IN FILE CA (1907 TO DATE)
1 REFERENCES TO NON-SPECIFIC DERIVATIVES IN FILE CA
98 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 145:233134

REFERENCE 2: 145:106844

REFERENCE 3: 145:48545

REFERENCE 4: 145:48463

REFERENCE 5: 145:11297

REFERENCE 6: 144:415782

REFERENCE 7: 144:415778

REFERENCE 8: 144:394616

REFERENCE 9: 144:295967

REFERENCE 10: 144:295964

L79 ANSWER 11 OF 11 REGISTRY COPYRIGHT 2006 ACS on STN
RN **150499-40-4** REGISTRY
ED Entered STN: 08 Oct 1993
CN Lithium metaphosphate nitride oxide (Li3.3(PO3)N0.22O0.8) (9CI) (CA INDEX NAME)
DR 879093-90-0, 685094-61-5
MF **Li . N . O3 P . O**
AF **Li3.3 N0.22 O3.8 P**
CI TIS
SR CA
LC STN Files: CA, CAPLUS, USPATFULL

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | 0.22 | 17778-88-0 |
| O | 0.8 | 17778-80-2 |
| O3P | 1 | 15389-19-2 |
| Li | 3.3 | 7439-93-2 |

9 REFERENCES IN FILE CA (1907 TO DATE)
9 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 144:295964

REFERENCE 2: 140:377838

REFERENCE 3: 140:79719

REFERENCE 4: 136:328079

REFERENCE 5: 125:119400

REFERENCE 6: 124:214390

REFERENCE 7: 121:259666

REFERENCE 8: 121:137486

REFERENCE 9: 119:229988

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L2            20 S E4-E6
               E MASAYA/AU
               E MINO/AU
L3             1 S E3
L4             3 S E123
L5            10 S E139
L6            81 S E150,E151
               E SHINJI/AU
L7             4 S E3
L8             2 S E38
               E SHIBANO/AU
L9             2 S E67
L10            2 S E116
L11           25 S E118
               E YASUYUKI/AU
               E ITO/AU
L12            9 S E3
               E TIO S/AU
               E TIO S/AU
               E ITO S/AU
L13          712 S E3,E4
L14          298 S E264
               E ITO NAME/AU
L15          109 S E4
               E SHUJI/AU
               E MATSUSHITA/PA,CS
               E MATSUSHI/PA,CS
L16        88939 S E92-E99 OR MATSUSHITA?/PA,CS
L17           63 S (LI OR LITHIUM)()(P OR PHOSPHOR?)()(OXYNITRIDE OR OXY NITRIDE
L18          101 S (LI OR LITHIUM)()(N OR NITROGEN)()(P OR PHOSPHOR?)()OXIDE
L19          137 S L17,L18

     FILE 'REGISTRY' ENTERED AT 06:11:04 ON 26 SEP 2006
L20            1 S 184905-46-2
L21            0 S 184905-46-2/CRN

     FILE 'HCAPLUS' ENTERED AT 06:11:39 ON 26 SEP 2006
L22           98 S L20
L23          137 S L19,L22
L24            2 S L1-L16 AND L23
               SEL RN L1

     FILE 'REGISTRY' ENTERED AT 06:13:38 ON 26 SEP 2006
L25           19 S E1-E19
L26           18 S L25 NOT L20
L27           17 S L26 NOT LI/ELS
L28         3291 S (N AND O AND P AND LI)/ELS
L29           68 S L28 AND 4/ELC.SUB
L30          296 S L28 AND (TI OR V OR CR OR MN OR FE OR CO OR NI OR CU OR ZR OR
L31            7 S L30 AND L30 AND 5/ELC.SUB
L32          289 S L30 NOT L31
L33           96 S L32 NOT CCS/CI
L34           55 S L33 AND NR>=1
L35           41 S L33 NOT L34
L36           20 S L35 NOT (NA OR GE OR ZN OR K OR IN OR MG OR GA OR HG OR F OR
L37           14 S L36 NOT (H2O OR H4N OR TETRAMETHYL)
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     FILE 'HCAPLUS' ENTERED AT 06:28:46 ON 26 SEP 2006
L38          164 S L29
L39          183 S L23,L38
L40           62 S L39 AND L27
L41            5 S L31 OR L37
                 E ELECTROLYTE/CW,CT
L42         2018 S E3,E4
L43        61460 S E19,E20
                 E E20+ALL
L44        91031 S E4+NT
L45        40871 S E26+OLD,NT OR E27+OLD,NT OR E28+OLD,NT OR E29+OLD,NT
                 E BATTER/CW,CT
L46        62556 S E6-E8
L47        18618 S E18
                 E E7+ALL
L48       109307 S E1 OR E2+OLD,NT OR E3+OLD,NT OR E4+OLD,NT OR E5+OLD,NT
                 E E4+ALL
L49        40018 S E21+OLD,NT OR E22+OLD,NT
                 E E6+ALL
L50        33321 S E3+NT
                 E E8+ALL
L51        73918 S E7+OLD,NT OR E28+OLD,NT OR E29+OLD,NT
L52           58 S L40 AND L42-L51
L53            5 S L41 AND L42-L51
L54           33 S L52 AND (PY<=2002 OR PRY<=2002 OR AY<=2002)
L55            2 S L53 AND (PY<=2002 OR PRY<=2002 OR AY<=2002)
                 E NITRIDE/CW,CT
L56        13446 S E4,E10,E11
                 E E11+ALL
L57         1837 S E26,E27
L58            0 S L55 AND L56,L57
L59            4 S L54 AND L56,L57
                 E TRANSITION METAL/CT
L60            2 S E3
                 E TRANSITION METALS/CT
L61        51710 S E3
                 E TRANSITION METALS,/CT
L62        23215 S E7,E10,E18,E19
L63            1 S L54 AND L60-L62
L64            4 S L59,L63
L65            7 S L1-L16 AND L52-L55
L66            3 S L65 AND (PY<=2002 OR PRY<=2002 OR AY<=2002)
L67            6 S L64,L66
L68            4 S L65 NOT L67
L69           27 S L54 NOT L67,L68
L70           10 S L67,L68 AND (?ELECTROLYT? OR ?BATTERY? OR ?BATTERIE? OR FUEL
L71           27 S L69 AND (?ELECTROLYT? OR ?BATTERY? OR ?BATTERIE? OR FUEL CELL
L72           10 S L67,L68
                 SEL HIT RN

     FILE 'REGISTRY' ENTERED AT 06:41:12 ON 26 SEP 2006
L73           23 S E1-E23

     FILE 'HCAPLUS' ENTERED AT 06:41:54 ON 26 SEP 2006
                 SEL HIT RN L71

     FILE 'REGISTRY' ENTERED AT 06:41:58 ON 26 SEP 2006
L74           25 S E24-E48
L75            9 S L74 AND L29,L31,L37
L76            7 S L75 NOT NITRATE
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     FILE 'HCAPLUS' ENTERED AT 06:43:30 ON 26 SEP 2006
L77           26 S L76 AND L71

     FILE 'HCAPLUS' ENTERED AT 06:44:21 ON 26 SEP 2006

     FILE 'REGISTRY' ENTERED AT 06:45:18 ON 26 SEP 2006
L78            6 S L73 AND L29,L31,L37
L79           11 S L78,L76

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L2 ANSWER 1 OF 1 CA COPYRIGHT 2006 ACS on STN

Full Text | Citing References

IT **871836-55-4DP**, Iron lithium nitride phosphate (FeLiN0.2(PO4)), oxygen deficient
RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)
(electrode active mass having nitrogen-contg. phosphate compds. for secondary lithium batteries)
RN 871836-55-4 CA
CN Iron lithium nitride phosphate (FeLiN0.2(PO4)) (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | 0.2 | 17778-88-0 |
| O4P | 1 | 14265-44-2 |
| Li | 1 | 7439-93-2 |
| Fe | 1 | 7439-89-6 |

ACCESSION NUMBER: 144:72220 CA
TITLE: Active mass for secondary nonaqueous electrolyte battery, its manufacture, and the battery which uses the active mass
INVENTOR(S): Yoshizawa, Hiroshi; Nakanishi, Shinji; Koshina, Shigeru
PATENT ASSIGNEE(S): Matsushita Electric Industrial Co., Ltd., Japan
SOURCE: Jpn. Kokai Tokkyo Koho, 12 pp.
CODEN: JKXXAF
DOCUMENT TYPE: Patent
LANGUAGE: Japanese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

| PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|---|---|---|---|---|
| JP 2005353320 | A2 | 20051222 | JP 2004-170243 | 20040608 |
| PRIORITY APPLN. INFO.: | | | JP 2004-170243 | 20040608 |

bad date

AB The active mass comprises a N-contg. phosphate; and is manufd. by heating a phosphate compd. in a reducing atm.; and reacting with NH3 gas. The battery has a cathode and/or an anode contg. the above active mass.

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# EAST Search History

| Ref # | Hits | Search Query | DBs | Default Operator | Plurals | Time Stamp |
|---|---|---|---|---|---|---|
| S1 | 6 | "720219" | US-PGPUB; USPAT | OR | ON | 2006/09/22 15:33 |
| S2 | 1 | lipon near4 (dope or doped or doping) | US-PGPUB; USPAT | OR | ON | 2006/09/22 15:34 |
| S3 | 2 | lipon with (dope or doped or doping) | US-PGPUB; USPAT | OR | ON | 2006/09/22 15:34 |
| S4 | 0 | "lithium phosphorous oxynitride" with (dope or doped or doping) | US-PGPUB; USPAT | OR | ON | 2006/09/22 15:34 |
| S5 | 56 | "lithium phosphorous oxynitride" | US-PGPUB; USPAT | OR | ON | 2006/09/26 11:29 |
| S6 | 59 | "lithium phosphorous oxynitride" | US-PGPUB; USPAT; EPO; JPO; DERWENT | OR | ON | 2006/09/22 15:34 |
| S7 | 2 | "lithium phosphorous oxynitride" same transition | US-PGPUB; USPAT; EPO; JPO; DERWENT | OR | ON | 2006/09/22 15:34 |
| S8 | 2 | ("20020034688"\|"5597660").PN. | US-PGPUB; USPAT | OR | ON | 2006/09/25 12:44 |
| S9 | 2 | "2002203593" | US-PGPUB; USPAT; JPO; DERWENT | OR | ON | 2006/09/26 11:29 |